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Perceptions of the Texas State and Federal Closures Among Inshore Shrimpers in Galveston Bay, Texas and Calcasieu Lake, Louisiana

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PERCEPTIONS OF THE TEXAS STATE AND FEDERAL CLOSURES AMONG INSHORE SHRIMPERS IN GALVESTON BAY, TEXAS AND CALCASIEU LAKE, LOUISIANA

BY

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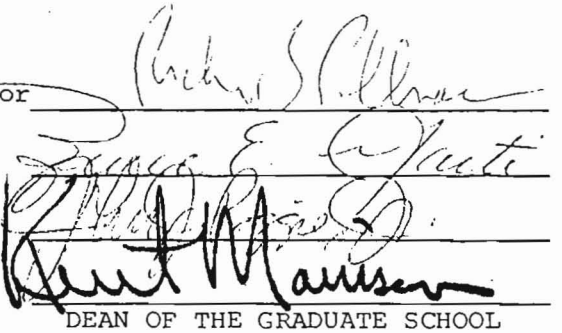

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ABSTRACT

The inshore shrimp fisheries along the coast of the Gulf of Mexico represent a significant portion of the total shrimp harvest in the Gulf. The shrimp harvest is allocated to the offshore and inshore fisheries through the use of season closures. In 1981, the Gulf of Mexico Regional Fisheries Management Council began implementing a policy known as the Texas Closure; a seasonal closure of the waters of the Federal Conservation Zone concurrent with the traditional season closure of the state waters of Texas. One impact of the Texas Closure on the offshore fishery has been fleet displacement from Texas to Louisiana waters. When offshore shrimpers were surveyed as to their perceptions of the Texas Closure, the most discontent was expressed among those shrimpers closest to the Texas/Louisiana border. This thesis examines the perceived impacts of the Texas Closure on the inshore shrimpers of the two bays closest to the Texas/Louisiana border: Galveston Bay, Texas and Calcasieu Lake, Louisiana to ensure that the Texas Closure has not had negative side effects on these user groups. Surveys were administered to shrimp captains in both regions to determine socio-demographic trends occurring in the fisheries and to assess the perceptions of the Texas state and federal closures. In-depth interviews were conducted as well with a variety of participants in various levels of the fishery. The model of human ecology is used to describe the study area

and generate predictions of impacts. The results indicate that, for the most part the Calcasieu Lake shrimpers were much less opinionated about the Texas Closure than the Galveston Bay population. In addition, the perceptions of shrimpers in both regions towards the Texas state closure and Texas Closure were very consistent, suggesting that the two closures are perceived as one large closure. This suggests that the Texas Closure has had no additional impacts than the state closure already has. Those Galveston Bay shrimpers who had an opinion were equally divided between approving and disapproving of the Texas Closure. This difference was related to vessel size. Larger inshore boat captains felt personally impacted by the Texas Closure presumably because they have been able to shrimp just beyond the state territorial sea when the state closure was implemented prior to the implementation of the Texas Closure. These captains of larger boats tended to disapprove of the Texas Closure. The captains of small boats who had an opinion expressed support for the Texas Closure because it serves as a conservation measure which enables more shrimp to spawn before being harvested. Due to geographical limitations, fleet displacement was not perceived to personally impact the inshore shrimpers from either bay.

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I am also grateful for the support of my mother and father Lee and Sam, my sister and best friend Sally; my friends, Lisa, Tina, Enid, Pam and Gordon for their

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INTRODUCTION

Statement of Purpose

In 1981, the Gulf of Mexico Regional Management Council implemented the Shrimp Management Plan for the shrimp fishery occurring in the federal waters of the Gulf of Mexico (Gulf of Mexico Fishery Management Council, 1981). One of the most controversial measures in the plan is known as the Texas Closure. The Texas Closure is a seasonal closure of the federal waters off Texas concurrent with the seasonal closure of state waters that Texas has implemented since 1959 (see Figure 1). The two closures occur from approximately June 1 through July 15. The purpose of the state closure is to allow the shrimp to grow to a larger more valuable size before harvesting. The purpose of the Texas Closure is threefold: 1) to add protection to the shrimp throughout their entire migration; 2) to help Texas enforce its state closure, and 3) to minimize the wasteful discard of undersized shrimp through the simultaneous elimination of size restrictions on shrimp caught in state waters (Gulf of Mexico Fishery Management Council, 1981). To date, the biological, economic, and social impacts of the Texas Closure on the offshore shrimp fishery have been monitored (Poffenberger, 1982; Jones et al., 1982; Jones and Zweifel, 1982; Klima et al, 1987). No attempts, however, have been

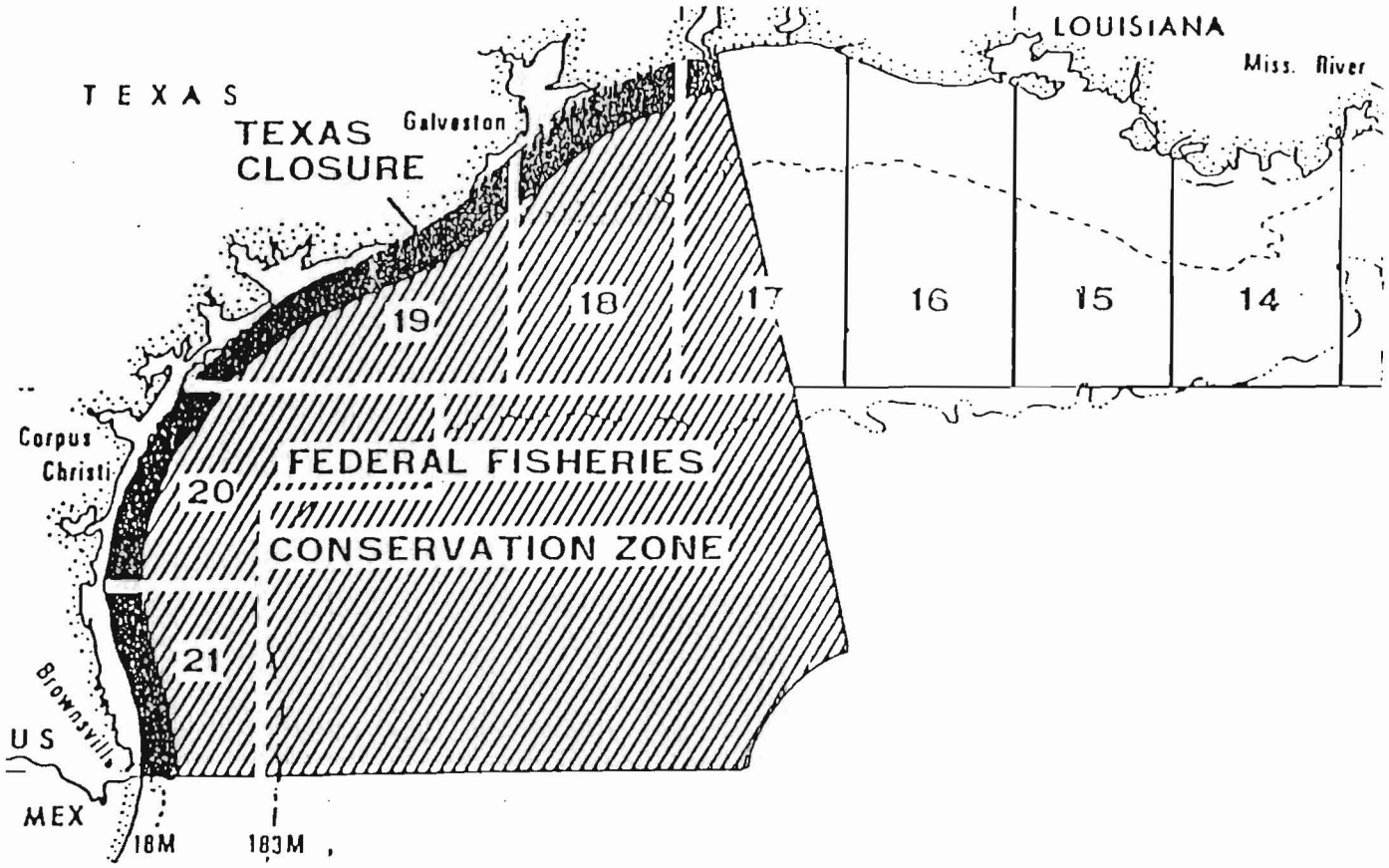

Figure 1. The Texas State and Texas Closures.
Source: Klima et al., 1987.

made to examine the impacts of the Texas Closure on the inshore shrimp fisheries which harvest shrimp at an earlier stage in their life cycle. Management of the shrimp fishery has allocated shrimp to the inshore and offshore shrimp fisheries through the use of season closures.

This thesis examines the perceived impacts of the Texas Closure on the two inshore shrimp fisheries of Galveston Bay, Texas and Calcasieu Lake, Louisiana--the two bays closest to the Texas/Louisiana border. These two bays were chosen based on the results of a survey of offshore shrimp captains along the Gulf of Mexico regarding their support of the Texas Closure (Klima et al., 1987). Klima's results revealed that the captains closest to the Texas/Louisiana border were least supportive of the Texas Closure. Fleet displacement was the major reason for their disapproval of the Texas Closure. That is, when the season closure extended the entire 200 miles of the Federal Conservation Zone, the boats that historically shrimped in the federal waters off Texas were displaced into Louisiana. When the season opened, the Texas boat captains disapproved of the out of state boats shrimping in the waters off Texas. Hence, it was believed that if the Texas Closure negatively impacted the inshore shrimp fisheries in any way, it would be reflected in the perceptions of the inshore shrimp captains shrimping in those bays closest to the Texas/Louisiana border.

This study, for two reasons, examines the perceived impacts of the Texas Closure on the inshore shrimp fisheries rather than actual impacts. First, the study was conducted seven years after the implementation of the first Texas Closure. Not only had this enabled the shrimpers to become accustomed to the Texas Closure by the time of the study, but the impacts were confounded by the alteration of the Texas Closure in 1986 when it was reduced to 15 miles. The reduction was an attempt to alleviate the fleet displacement that occurred with the 200 mile Texas Closure. In 1989, the Texas Closure extended out to 200 miles again due to enforcement problems with the 15 mile Texas Closure. Consequently, there are no accurate data available to compare conditions before and after the implementation of the Texas Closure. Secondly, very little information on the social structure of the inshore fisheries is available. Little is known about the participants in the fisheries and in what ways they might have been impacted. Therefore, in addition to assessing the perceptions of the two popu-lations of inshore shrimpers, this research examines the social system operating in each fishery to shed some understanding on the relationship between the perceptions of the inshore shrimpers and their surrounding physical and social environments.

The social system operating within each inshore fishery is examined using the model of human ecology. Following is a brief description of: 1) the shrimp resource

and the orientation of the Texas and Louisiana shrimp fisheries; and 2) the model of human ecology.

The Shrimp Resource and Orientation of the Texas and Louisiana Shrimp Fisheries

The life cycle of Gulf shrimp lends itself well to management utilizing season closures because their migration patterns are predictable. Gulf shrimp, unlike South Atlantic shrimp, migrate perpendicular to the shoreline. After spawning occurs in the Gulf, the larvae, passing through a number of developmental stages, drift with the currents into the estuarine marshes where they become bottom dwellers. For between two and four months, they mature into juveniles, at which time they aggregate and begin moving into the deeper waters of the estuaries and back into the Gulf where they increase in size further and reproduce. Since shrimp are an annual crop, and each female produces over one million eggs, recruitment is unaffected by the previous years harvest. Rather, recruitment fluctuates depending upon climate, salinity, and pollution conditions in the estuaries (Klima et al., 1982). Consequently, the fishery cannot be overfished.

Of the six species of shrimp found in the Gulf of Mexico, two dominate the landings: brown shrimp (Penaeus aztecus Ives) and white shrimp (Penaeus setiferus Linnaeus). The largest concentrations of these species are found off the coasts of Texas and Louisiana, respectively. The timing and range of brown and white shrimp migrations differ, and the

inshore and offshore closures vary accordingly.

Brown shrimp migrate out to a depth of 11-20 fathoms. The post-larvas begin entering the estuaries in mid-February with a peak recruitment in March and April. Emigration from the estuaries occurs from May to July depending upon environmental conditions. Since 1959, the Texas state closure has been implemented to protect the brown shrimp during their migration into deeper waters until they have reached a larger more valuable size (Texas Shrimp Conservation Act, 1959). This is a closure of the state waters of Texas at the time the brown shrimp are migrating into the Gulf of Mexico. The season opens when the shrimp have reached an optimum size for harvest.

In contrast, the migration of white shrimp ranges from the estuaries out to a depth of only five fathoms. The white shrimp post-larvae begin entering the estuaries in May and emigration begins in late August. White shrimp remain in estuaries for a longer period of time and grow to a larger size than brown shrimp before emigrating to the Gulf. The seasons for white shrimp, therefore, are closed in inland waters in both states from approximately July 15 to August 15. Implementation of season closures are timed to both ensure a greater yield from the fishery, and to allocate the brown and white shrimp to the offshore and inshore fisheries, respectively.

The fact that Louisiana does not implement an offshore

closure of its shrimp fishery reflects the difference in orientation of the two states towards shrimp production. Louisiana targets small shrimp, under 68 tails to the pound, for the canned and raw-peeled markets. Texas targets large shrimp between 40 and 50 tails to the pound for the fresh and frozen markets (Gulf of Mexico Fishery Management Council, 1981). The two states target different size shrimp because concentrations of brown shrimp occur in Texas and white shrimp in Louisiana. White shrimp experiences most of their growth in inshore waters and spawn in the Gulf very close to the shoreline. An offshore closure of Louisiana's state waters would have little impact on the value of the harvest. Thus, the policies governing the Texas shrimp fishery have maximized the benefits of offshore shrimpers, whereas those governing Louisiana's shrimp fishery have evolved to maximize the harvest of inshore shrimpers. This difference in orientation has made it difficult to balance the interests of both states with respect to the implementation of the Texas Closure. Fleet displacement is enhanced by the fact that Louisiana does not implement an offshore closure.

The Model of Human Ecology

The model of human ecology is a descriptive approach to the analysis of a social system. Its central premise is that a social system is composed of a number of interrelated components. A change in any one part of the system may

influence a change in other parts as well. The model of human ecology is based on the concept of a system. The model of human ecology, derived from the classic work of Malinowski (1960), has in recent times been used extensively to study human inter- and intragroup relations (Acheson, 1975; Barth, 1956; Berkes, 1977, 1981, 1984, 1986; Durham, 1976; Poggie and Gersuny, 1974; Pollnac, 1984). These studies have examined the relationship between the behaviors of human populations and their total environments, the degree of dependency on particular resources, and the factors in the larger social environment that influence how populations manage and relate to their resources and to other populations.

The components of the social system that are examined in this study are based on those identified by Poggie and Gersuny (1974) in their study of the Point Judith fishermen in Rhode Island. The components in the social system include aspects of: 1) the physical environment; 2) the social environment; 3) bio-psychological and demographic characteristics of the population being studied; 4) technology; 5) ideological aspects of culture; and 6) social organization. This thesis examines how the ideology of each inshore fishery--the values, perceptions and beliefs, may be influenced by the other components of the social systems. By applying the model of human ecology to the present study, the research examines whether a change in governance, an

aspect of social organization, i.e. the Texas Closure, impacts the ideology of two populations (namely, the two inshore fisheries) within the system of the shrimp fishery. These impacts will be examined by relating differences in the social makeup of each fishery to their perceptions towards the Texas Closure.

Two hypothesis are tested in this research. First, it is hypothesized that the two inshore fisheries will have different perceptions towards the Texas Closure. This is expected because the two fisheries exist in extremely different social systems; Calcasieu Lake is in a rural, and Galveston Bay in an urban setting. Thus, different forces in their social systems are influencing their ideology, i.e. their perceptions towards the Texas Closure. Second, it is hypothesized that the perceptions of the inshore shrimpers in both communities towards the Texas Closure will be consistent with their perceptions towards the state closure. This is expected because the territorial sea of Texas extends nine nautical miles from shore, which is the extent of the state closure. The inshore fisheries of Galveston Bay and Calcasiseu Lake have been accustomed to the state closure since 1959. In addition, inshore boats between 20 and 40 feet tend not to shrimp beyond nine nautical miles, and larger shrimp boats that harvest in the federal waters off Texas would most likely be unable to shrimp in the bay due to depth and gear constraints.

CHAPTER TWO

METHODOLOGY

This study involved three months of fieldwork in Galveston Bay, Texas and Calcasieu Lake, Louisiana in the summer of 1987 through affiliation with the Galveston laboratory of the National Marine Fisheries Service (NMFS). NMFS was interested in assessing the impacts of the Texas Closure on the two inshore shrimp fisheries that are the focus of the present study. This interest was prompted by the results of the survey administered to offshore captains that identified the greatest amount of dissatisfaction with the Texas Closure among the captains closest to the Texas/Louisiana border. The goals of this study, therefore, are to: 1) identify the social, political, and geographical components of two individual populations of inshore shrimpers to examine how the surrounding environment may influence the ideology of the inshore shrimpers (for a description of the socio-cultural characteristics of the offshore Texas shrimp fleet, see Maril, 1983); and 2) assess the extent to which the perceptions of the Texas Closure differs from those of the Texas state offshore closure. A number of methodological strategies are utilized to fulfill these goals.

The first phase of the study involved extensive literature research on the biological nature of the fishery, techniques of harvesting shrimp, and the history of shrimp fisheries management. In addition, prior to beginning the

in-depth study of each community, a tour of the region surrounding each community was undertaken to formulate impressions and to decide on the most efficient means to study the shrimping communities in the limited time available to complete the fieldwork. The tour included brief informal meetings with marine extension agents in each community to explain the intentions of the study and generate support from local political figures associated with each fishery.

The second phase of the study included participant observation. The goal of this phase was to identify the infrastructure of each community and the different components of the industry. Initially, it was necessary to understand the social makeup of the two fisheries and to become sensitive to each population's local issues of concern. The first month, therefore, was spent identi-fying as many sectors of the fisheries as possible; their interrelationships, language, conflicts of interest, concerns, and perceptions. In-depth interviews were conducted with marine extension agents, Vietnamese community leaders, leaders and members of regional shrimp organizations, shrimpers, shrimp house owners, owners of marine supply stores, net makers, and bank loan officers. In addition, fishing trips with inshore shrimpers were undertaken in each region throughout the summer to observe the territories in which shrimpers work, and the social system that operates within their work place.

The third phase of the study involved writing and administering three surveys tailored to the social, technological, and governmental makeup of the fisheries. One survey was administered to inshore shrimp captains in both Galveston Bay and Calcasieu Lake. License lists of captains were supplied by the Texas Parks and Wildlife Department (1981, 1986) and the Louisiana Department of Wildlife and Fisheries (1986). The Louisiana Department of Wildlife and Fisheries was unable to supply license lists from 1981 due to a lack of available data. The two years were picked to document changes in the license structure of inshore shrimpers since the first implementation of the Texas Closure. The licenses were drawn from the counties surrounding each estuary.

The captains were picked using a fortran pseudorandom number program so that all licenses had equal probabilities of being selected. Three sets of lists were drawn based upon vessel size to include a representative sample from each of three size categories: boats less than 21 feet, boats between 21 and 40 feet, and boats greater than 40 feet. These size classifications were chosen initially based upon observations of the differences in fishing locations between each size group. It was observed that as vessel size increased, there seemed to be a corresponding increase in the number of shrimpers who harvested both offshore and inshore and who were more economically dependent on shrimping. Although

this trend was not documented at the time, it was presumed that this assumption would ensure representation of all vessel sizes, thereby minimizing any bias towards a particular segment of the fishery.

When phone numbers could be obtained, surveys were conducted with captains by telephone. The survey was mailed to those names with unlisted phone numbers or without telephones. The mail survey inevitably excluded shrimpers who traveled from outside the regions and those unable to understand English. Since only 15 mail responses were returned out of a possible 188, these surveys were discarded due to the potential bias inherent in such a self selection process.

To supplement this randomized survey effort, interviews were conducted at docks around the perimeter of each bay. This additional effort ensured that: 1) enough interviews for analysis were completed in the limited time available; 2) all regions in each bay were represented in the survey, and; 3) migrants and ethnic groups unable to understand English such as the Vietnamese, Italians, and Hispanics were represented. Interpreters were used to interview members of each ethnic population. Dockside interviews were also beneficial in that they allowed the researcher to probe and clarify responses. Each survey required between 10 and 20 minutes to administer.

The drawback to the above-mentioned methodology

assumes that all shrimpers dock their boats at shrimp houses. The consequence of this assumption is that those who do not dock their boats at a shrimp house were not included in the survey. This methodological assumption had important consequences for the Calcasieu Lake sample because those who shrimp with pontoons are not associated with a fish house. Consequently, this population was not well represented in the sample. Although they are a significant part of the inshore fishery of Calcasieu Lake, only two shrimpers utilizing pontoons were interviewed. The interviewers completed a total of 147 interviews; 83 from Galveston Bay (approximately 15 percent of licensed vessel owners) and 64 from Calcasieu Lake (approximately eight percent of licensed vessel owners). A list of the number of interviews completed by the various methods is presented in Table 1.

The use of procedures such as those used in the present study are controversial because the methods are not truly random. However, due to the difficulty in obtaining truly random samples among human populations, social scientists often use non-random methodologies to acquire the most unbiased data as possible (Babbie, 1973; Chein, 1976; Freund, 1960; Hogben, 1968; Honingman, 1970; Pollnac and Poggie, 1978; Sellitz et. al, 1976; Selvin, 1957; Thomas, 1976).

Many factors made it difficult to obtain a truly random sample including time and language constraints, lack

of phone connections to rural areas, and mobility of the shrimpers. To minimize potential systematic error due to time, location, and language constraints, every dock around each bay was sampled in the morning, afternoon, and evening repeatedly throughout the summer. Every boat docked was approached to administer a survey to the captain. Thus, it is believed by the researcher that the characteristics of the sampled population are closely representative of the target groups; more so than if strictly random procedures were used. Thus, the application of quantitative statistics is believed to be justified.

In addition to the interviews administered to shrimp captains, questionnaires were distributed to shrimp house owners to determine: 1) the source and destination of their product; 2) how long they have owned their business to identify trends in expansion; and 3) the extent of integration with other sectors of the shrimp industry. This information was useful in identifying the development of the infrastructure of the two fisheries.

Questionnaires were also administered to deckhands when time permitted. These were all dockside interviews. A total of 52 deckhand interviews were completed: 28 from Calcasieu Lake, and 24 from Galveston Bay. It would have been desirable to undertake a more thorough study of the population of deckhands, however time permitted only a small effort to be directed toward this segment of the fishery.

Table 1 . Number of interviews obtained by various methods.

Interview Method	**Galveston Bay**	**Calcasieu Lake**
Total Numbers Drawn from License List	149	122
Interviews Completed by Phone	37	11
Dockside Interviews	46	53
Total Completed	83	64

The results will be examined in a very general way in an attempt to understand in more depth some of the underlying trends in the fisheries.

The last phase of the study involved in-depth interviews with both "old-timers" (those who have been shrimping for roughly 15 years or more) and more recent entrants into the fishery, including both shrimpers and shrimp house owners. The subjects represented a sample of individuals who entered the fishery at various times since the early 1930s. The purpose of these interviews was to record an oral history of the fishery to discover precisely why individuals were motivated to enter the fishery when and how they did. A few isolated stories were collected that together reflected some of the trends within the two fisheries. They provided an opportunity to discover how changes in the larger ecosystem directly impacted individual lives, and the larger populations of the fisheries. These interviews were recorded on tape and transcribed.

CHAPTER THREE

HISTORICAL EVOLUTION OF THE GALVESTON BAY AND CALCASIEU LAKE INSHORE SHRIMP FISHERIES

1900-1949

From the beginning of the 20th century to the late 1930s, the Gulf of Mexico shrimp fishery was marked by technological innovations in gear type stimulating exploration and exploitation. Prior to 1938, the demand for shrimp was entirely supplied from the bays and shallow waters of the Gulf (U.S. Department of the Interior, FWS, 1958). Until 1917, shrimp were caught with labor inten-sive haul seines. Annual production of shrimp averaged 5.9 million pounds (tails) in Louisiana, and 172,000 pounds in Texas (Klima et al., 1982). Two technological innovations sparked the expansion of the shrimp fishery during this time: 1) the introduction of the otter trawl in 1917; and 2) the invention of the mechanical winch (invented by a Galveston shrimper, Henry Blume) in the early 1930s (Klima et al, 1982; Galveston Bay shrimper, 1987). Combined with the introduction of the otter trawl, the winch fueled the expansion of the offshore fishery. Large scale production of white shrimp began in 1938 following the discovery of the Ship Shoal grounds off Morgan City, Louisiana. National publicity of these grounds opened up new markets (U.S. Department of the Interior FWS, 1958). The shrimp industry at that time was dominated by large integrated companies that owned fleets operated by hired captains.

By the early 1930s, Galveston Bay had become a commercial shrimp port with three large shrimp houses: Liberty, owned by a Greek family; Grasso's, owned by an Italian family; and Blume's, operated by a local family native to the area (Galveston Bay shrimp house owner, 1987). Like the rest of the Gulf, these companies operated fleets, and incorporated net and supply shops, repair facilities, and fuel docks within their facilities. All captains were hired; there were few independent owner/operators. The markets were local due to the perishability of shrimp and the lack of appropriate technology for preservation. Due to limited markets, the companies imposed a 500 pound per day limit on their vessels (Galveston Bay shrimper, 1987).

Cameron, Louisiana, situated at the mouth of Calcasieu Lake, was an important shrimp port as well. The first shrimp house in the area, known as Steeds, opened in 1935. It is still operating as a major shrimp house in the region. Soon after, approximately four additional shrimp houses opened to service the Gulf offshore shrimp vessels. Through arrangements with the railroad company, shrimp houses in Cameron had access to distant markets. Shrimp were stored in a vault in Lake Charles from where it was shipped to New York, Chicago (the "shrimp capital" of the U.S.) and other parts of the U.S. Ice houses along the railroad route kept the shrimp preserved.

From 1927 through 1945, the annual harvest of white

shrimp increased to 40.5 million pounds in Louisiana, and 7.8 million pounds in Texas (Klima et al., 1982). During the 1940s and 1950s, exploitation and marketing patterns of Galveston Bay and Calcasieu Lake shrimp changed dramatically for a number of reasons. First, in 1946, enormous concentrations of white shrimp were discovered in the Gulf of Campeche, Mexico. Demand subsequently increased and high earnings attracted many new fishermen. But shortly following this discovery, the shrimp industry experienced a dramatic decline in white shrimp production for unknown reasons (U.S. Department of the Interior, FWS, 1958). Prior to 1947, brown shrimp were unmarketable due to their color although small amounts were dried, canned, and breaded (U.S. Department of the Interior, FWS 1958). Since production of white shrimp was so low in Texas, boats began to land mixed catches of white and brown shrimp. Texas boat operators commissioned a broker in Brownsville, Texas to market their shrimp. Following their first marketing effort in San Francisco, a new market had opened that was able to absorb all brown shrimp landed. At the same time that domestic markets were expanding, foreign exports to Japan had opened markets so that an unlimited supply of shrimp could be harvested and marketed. By 1948, the average annual shrimp production in Texas had increased from 7.8 million pounds to 13.8 million pounds (Klima et al., 1982).

1950-1980

The marketing of brown shrimp combined with improvements in freezing capacity once again increased demand for shrimp. By 1950, a freezer was installed in one of the large Galveston Bay shrimp houses. Population around Galveston Bay was steadily increasing. As a result, local demand increased and smaller shrimp houses began to establish themselves around the perimeter of the Bay closer to local markets (Galveston Bay shrimper, 1987). Freezers in Galveston enabled shrimp houses around the perimeter of Galveston Bay to store shrimp for future distribution when local markets could not immediately absorb harvested shrimp. Increasing local markets coupled with storage capacity sparked the growth of Galveston Bay's inshore shrimp fishery.

Improvement in preservation technology occurred in the 1950s enabling trucks to have freezing capacity. This technological improvement made it possible for shrimp to be harvested and landed in areas of the Bay outside the City of Galveston. Shrimp that could not be marketed locally by these smaller shrimp houses were trucked to Galveston for storage. With the expansion of local markets and the locus of the fishery dispersing around Galveston Bay, many of those who were previously part-time shrimpers and part-time farmers of rice and soybean, found it economically advantageous to become full-time shrimpers (Galveston Bay shrimper, 1987).

In addition, the Galveston Yacht Basin, constructed in 1952, supported a growing bait fishery. By 1954, the average annual landings in Texas equalled 50 million pounds (Klima et al., 1982). This mobility in the fishery also encouraged the further expansion of domestic markets, resulting in the development of brokering as an important link in the industry.

The resulting growth of the inshore fishery created competition between inshore and offshore shrimpers in Galveston Bay for the shrimp stocks. This competition culminated in the passage of the Texas Shrimp Conservation Act of 1959; the first piece of legislation in Texas that allocated shrimp to user groups. The Act established seasons for the inshore white shrimp fishery and the offshore brown shrimp fishery. The inshore bay shrimpers were permitted to harvest shrimp from August 15 to December 15, corresponding to the presence of white shrimp in the bays and following the emigration of the brown shrimp into the Gulf. Competition between the inshore and offshore shrimpers was further reduced by restricting boats in the bays to one trawl, a step which economically excluded the larger offshore vessels (Johnson and Libecap, 1982). These measures essentially allocated most of the brown shrimp to the offshore fishery. In addition, the outside waters of Texas, extending from four fathoms to nine nautical miles (10.35 statute miles), were designated to be closed for approximately 45 days during the

brown shrimp migration to the Gulf to enable them to grow to a larger and more valuable size (Texas Shrimp Conservation Act, 1959). The season closures combined with size restrictions of 39 whole shrimp per pound for brown shrimp caught in Texas waters reflected the importance Texas placed on targeting medium and large shrimp.

The Texas Shrimp Conservation Act was amended in 1963 following strong opposition from the bay shrimpers who resented being denied access to brown shrimp without deriving any benefits from this restriction (Shrimp-Conservation Research and Studies, 1963). Consequently, the 1963 amendment provided for a limited spring season from May 15 to July 15 in which the bay shrimpers were permitted to harvest 300 pounds of brown shrimp per day. The bait shrimp fishery was established as a year-round fishery in which bait shrimpers were permitted to harvest 150 pounds of shrimp per day, one half of which must be kept alive (Shrimp-Conservation Research and Studies, 1963).

Improved technology in the 1940s and 1950s also sparked a change in the shrimp fishery in Cameron, Louisiana. A freezer was installed at Steed's shrimp house during this era as well (Steed's employee, 1987). Freezing capacity for shrimp served to even out production over the year since shrimp could be frozen and stored throughout the winter. The market for Steed's shrimp increased and they, in turn, built a fleet of boats operated by hired captains. Improvements in

the trucking industry opened up markets for their shrimp and they began to ship shrimp in five pound boxes to larger freezers in Pascagoula, Mississippi to facilitate distribution to northern markets by brokers.

Louisiana had established season closures for inside waters in 1942 (West's Louisiana Statutes Annotated, 1987). In 1958, the closures were revised to occur from December 21 to April 30, and from July 1 to the third Monday in August. This amended the 1942 regulations by delaying the open seasons by one month. Accompanying this later opening, the 1958 amendments eliminated the size limit of 68 shrimp to the pound for the spring and fall seasons. Presumably the opening was timed to occur when the shrimp had reached this count.

During the 1960s and 1970s, a declining economy and changes in gear technology initiated the growth of the inshore fishery of Calcasieu Lake. Until this time, as in Galveston Bay, many shrimpers in Calcasieu Lake were part-timers who held jobs in the nearby communities of Sulphur, Vinton, and Lake Charles (Cameron marine extension agent, 1988). The true significance of shrimping to the local economy was realized as a result of increasing fuel costs and an economic slump in the construction industry in the mid-1970s (Cameron marine extension agent, 1988). In 1971, the first shrimp house along the Lake was established to take advantage of the reduced transportation costs for

unloading shrimp close to the areas of production, to offer protection from hurricanes, and reduce insurance costs (Cameron marine extension agent, 1988). In 1974, the addition of freezer capacity at this inshore shrimp house initiated a dramatic increase in production in Calcasieu Lake (Calcasieu Lake shrimp house owner, 1987). By 1975, another shrimp house opened and since then four to five others have also opened, frequently closing or changing ownership (Calcasieu Lake shrimp house owner, 1987).

During the 1960s, technological change in harvesting techniques were being developed in Louisiana to harvest inshore shrimp. One modification was the invention of the butterfly net which enabled shrimp to be harvested as they drift out of their estuarine nursery grounds during the high tides (Edwards, 1986). This gear type is used primarily for the night fishery since shrimp are negatively phototaxic. Rather than shrimping the bottom as trawls do, butterfly nets shrimp the water column. Butterfly nets are nets attached to square frames that are raised and lowered mechanically from the side of the boat. The boat travels against the current with the nets lowered. They are operated largely by part-timers due to the suitability of the gear for use during off hours of land based jobs.

In 1978, approximately 89 percent of Louisiana's inshore fishery were part-time shrimpers (Roberts and Sass, 1980). Increased effort in the inshore fishery, resulting

from the growth of the butterfly netters, added further pressure on the inshore shrimp population and drove the size of harvested shrimp even smaller. Between 1973 and 1976, shrimp 51 count and smaller comprised 92 percent of the inshore catch. This represented an increase in the proportion of the catch in the small size from the 1963-1972 period of which 63 percent of the total Louisiana inshore catch was made up of small shrimp (Roberts and Sass, 1980). Despite an increase in effort, the average annual Louisiana landings between 1956 and 1976 was 20.2 million pounds, half of what it was between 1927 and 1945 (Klima et al., 1982). Currently, the minimum size restriction of small shrimp is 100 count (West's Louisiana Statutes Annotated, 1987).

At the same time that Louisiana's effort was shifting to the inshore fishery, both the inshore and offshore fishery in Texas had been expanding. Effort in the offshore fishery intensified in 1972 as Gulf shrimpers began pulling four trawl nets which made their operations more efficient than the pulling of two trawl nets. Beginning in 1950, with the discovery of the brown shrimp grounds, Texas landings exceeded those of Louisiana (Klima et al., 1982).

During the 1970s, when fuel prices increased, a modification to butterfly nets emerged, called pontoons. Pontoons are butterfly nets suspended from stationary platforms. They are simple in design and inexpensive to produce. They are small square platforms set on floata-tion

devices. On the platform is a mechanical winch that maneuvers the lowering and raising of the one or two butterfly nets. Pontoons are situated in either the middle of channels or along the banks. The only fuel required to shrimp with a pontoon is for a small aluminum outboard boat that transports the shrimper from his/her pontoon to shore and back. Initially pontoons were used largely to generate supplemental income for oil company workers (Cameron marine extension agent, 1987). It is estimated that these part-timers were grossing between $20,000-$40,000 per year (Cameron marine extension agent, 1987). Many of the part-time shrimpers became full-timers during the slump in the oil industry. Today the total butterfly net/pontoon fishery accounts for approximately 50 percent of recorded Louisiana shrimp landings (Edwards, 1986).

The management of butterfly nets and pontoons reflects the coordinated efforts of legislation and self-regulation. The regulation of butterfly nets first appeared in the legislation in 1964 when their use was restricted during the closed seasons. In 1974, the legislation was amended so that commissioners were given the right to "set special shrimp seasons for all or part of the inside waters" (West's Louisiana Statutes Annotated, 1987). This amendment provided the impetus for what is know in Calcasieu Lake as "a special outgoing tide butterfly season" (Cameron marine extension agent, 1987). When there is an

indication that large amounts of brown shrimp are in the Lake during the inshore closure, a portion of Cameron Pass extending three miles into inside waters is opened for one week for larger boats with butterfly nets to "push" the outgoing tide for brown shrimp. They are prohibited, however, to reverse their direction and harvest incoming white shrimp. Due to the increased costs of fuel, these offshore vessels are now finding it more economically advantageous to harvest larger quantities of smaller shrimp than search for larger shrimp in the Gulf (Cameron marine extension agent, 1987). This is leading to further intensity of pressure in the inshore and near shore waters. Legislation is reflecting this trend. For the first time, butterfly nets were permitted during daytime hours in 1986; no longer are they limited to a night fishery (West's Louisiana Statutes Annotated, 1987).

The regulation of pontoons had been largely achieved through informal agreements. When the use of this stationary gear was beginning to intensify, disputes occurred between operators of mobile boats and stationary pontoons, the former complained that the latter were obstructing navigation. Legislation was passed requiring that pontoons be moved to the banks when not in use (West's Louisiana Statutes Annotated, 1987). An informal agreement between the pontooners and the draggers, however, has been reached in which the pontooners may keep their barges situated on the

west side, while the draggers use the right side of Old River, the area where the greatest concentrations of pontoons exists (Calcasieu Lake shrimper, 1987; Cameron marine extension agent, 1987). Enforcement agents have been directed to disregard the written law in this situation. Currently, the new industry representative has not commented on his position regarding this informal contract between the pontooners and the draggers. Consequently, pontooners are waiting for his comment before deciding whether to invest in additional pontoons. In turn, enforcement agents are awaiting notification on when and if they should enforce the written legislation requiring the removal of pontoons when not in use (Cameron marine extension agent, 1987).

1981-1988

The diversity of harvesting methods and declining economic rents influenced Louisiana's management of its season closures and gear restrictions. Galveston shrimpers also attempted to control competition through informal agreements and exclusion of outsiders. In 1981, the native shrimpers tried to control the number of additional Vietnamese boats that entered the fishery through an informal agreement in which the Vietnamese agreed to: 1) discourage other Vietnamese from moving into Seabrook or buying additional boats; 2) sell their shrimp for the same price as native shrimpers or within 10-15 cents of that price; and 3)

refrain from dragging one net with two boats (Johnson and Libecap, 1982). The agreement was not binding and more boats continued to enter the fishery. The contract was also considered to be in violation of antitrust laws. Informal agreements between the native and Vietnamese shrimpers in Galveston Bay also attempted to restrict access of the Vietnamese to the Houston Ship Channel. The rationale for this agreement is that due to the hazardous nature of shrimping in the ship channel their inability to understand English makes it particularly dangerous for the Vietnamese and for commercial shipping interests. Because the ship channel is one of the most productive shrimping grounds in Galveston Bay, increasingly more Vietnamese are exploiting these grounds despite this agreement.

Although agreements to restrict or allocate resources among Galveston Bay shrimpers has not yet been accepted, access to the inshore resource by non-residents has been minimized through legislative action taken in 1987 increasing license fees for out-of-state residents. The fee for a non-resident inshore shrimp license is four times that of a resident license, and a non-resident Gulf license is twice that of a residence (Texas Parks and Wildlife Department, 1987). It is important that Gulf shrimpers maintain their accessibility to all waters and ports in the Gulf of Mexico due to the mobile nature of the fishery. A summary of the historical trends is presented in Table 2.

YEAR	CHANGE	RESULT	MANAGEMENT
1917	otter trawl/mechanical		
1930's	white shrimp concentrations found in La.	large scale production in La. distant markets	shrimp houses impose landing limits on inshoreshrimpers in Galveston due to lack of markets first inshore season closures in La.
1946	white shrimp found in Mexico	growth in Tx. fishery	
1947	collapse of white shrimp fishery of Mexico	growth of brown shrimp fishery markets expand locally and foreign	
1950	freezer capacity and improvement in trucking	local supply increases fishery expands around Galveston Bay	
1952	Galveston Yacht Basin Built	bait fishery expands	
1959			Texas Shrimp Conservation Act--State Closure
1963			Shrimp Conservation Act amended to provide more access to shrimp for inshore shrimpers
1960's	butterfly nets in La.		
1964			use of butterfly nets restricted in La.
1970's	growth in offshore fishery in Tx. economic slump in La. Vietnamese enter fishery	growth in Calcasieu Lake's inshore fishery	
1981			Texas Closure - 200 miles
1987	fleet displacement during Texas Closure recognized as a problem among offshore shrimpers		Texas Closure reduced to 15 miles
1988		violations of Texas Closure	
1989			Texas Closure - 200 miles

Table 2. Historical trends in the shrimp fisheries of Galveston Bay and Calcasieu Lake

CHAPTER FOUR

DESCRIPTION OF THE STUDY AREA

The aim of this chapter is to identify each inshore fishery as two populations whose existences are a result of sometimes similar, and other times dissimilar, environmental conditions. The description integrates the information gathered from the literature research, personal observations, and both in-depth interviews and survey results. The chapter incorporates a description of various components of each fishery: the physical and social environments surrounding the bays; demographic profiles and social structure of the fisheries; and the governance regimes. These are integral components of the social ecology of the inshore shrimp fisheries. The differences between the populations, with respect to these elements, serves as the foundation for analyzing differences in the shrimpers perceptions of the state offshore closure and the Texas Closure.

Galveston Bay

Physical and Social Environments

Galveston Bay is an irregularly shaped estuary 17 miles long by three miles wide at its most distant points (see Figure 2). Its average depth is less than ten feet, exclusive of navigation channels (TWC, 1988). The bay is heavily used for shipping, transportation, recreational fishing and boating, and the commercial harvest of shrimp, oysters, and crabs. Waterborne commerce accounts for 45 percent of the City of Galveston's economy (Galveston Chamber of Commerce, Economic Development Council, 1986). Galveston Bay is bordered on the south and north by the cities of Galveston and Houston, respectively, which are becoming increasingly linked by the expanding communities on the west side of the bay.

The north, south, and west sides of the bay are industrially developed containing 50 percent of the nations petrochemical production, with Texas City home to the largest petrochemical complex in the United States. In addition, nearly all of the nations rubber is produced by industries bordering Galveston Bay (TWC, 1988). The Port of Houston is one of the most valuable ports in the United states boasting the nation's largest volume of exports in 1988. In 1975, it was estimated that industry located along the Houston Ship Channel accounted for nearly one third of the money generated by Houston (McComb, 1981: 21).

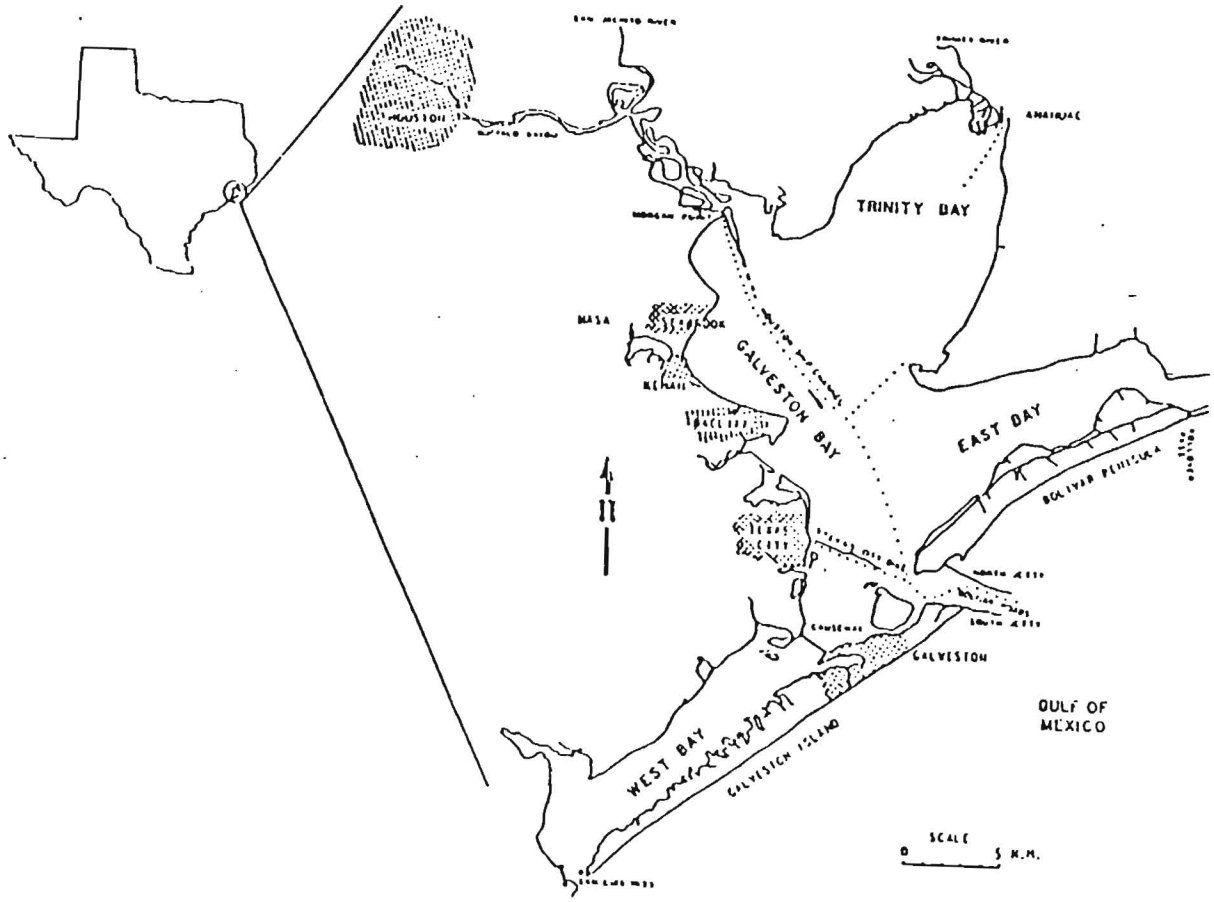

Figure 2. Galveston Bay.
Source: Tracor, Inc., 1971.

Four counties border Galveston Bay: Galveston, Brazoria, Harris, and Chambers. Harris and Galveston counties contain the largest concentration of people, while Brazoria and Chambers counties are predominately rural. The communities surrounding Galveston Bay have grown considerably in the past several decades (see Figure 3) and are expected to continue growing well into the 21st century (H-GAC, 1975). Employment trends in manufacturing, particularly those related to the petrochemical industries and service sector employment, are expected to increase while agricultural and mining jobs are expected to decrease (H-GAC, 1975). This indicates that the surrounding area was characterized by growth and expansion of both population and employment opportunities in the mid-1970s.

The north, south, and west side of Galveston Bay are ethnically diverse. Southeast Asians (predominately Vietnamese), Hispanics, and Italians comprise the majority of the immigrant groups residing around Galveston Bay. The east side of the bay is characterized by rural communities where farming (rice and soybean) and wildlife reserves dominate land use.

The participants in the inshore shrimp fishery represent both the native population and the growing immigrant presence in the bayside communities. Much of the

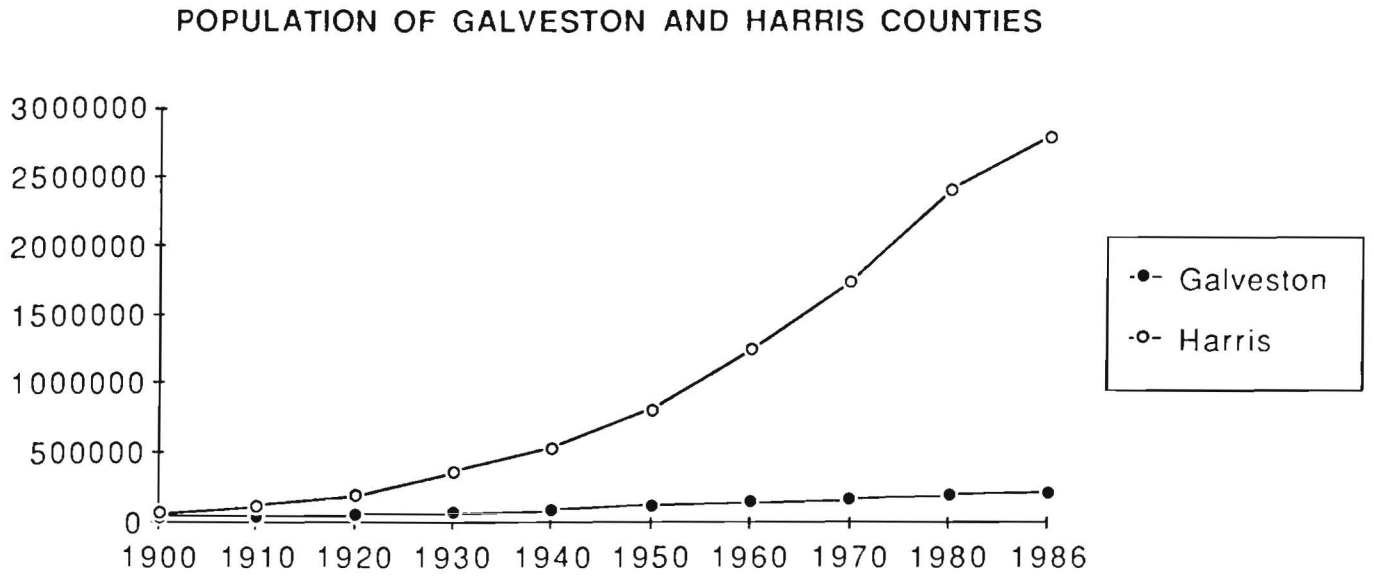

Figure 3. Galveston Bay Population by Counties
Source: US Bureau of the Census.

growth in recent years can be attributed to the expanding Southeast Asian population. According to the licenses of Galveston Bay boats, the number of Vietnamese owned boats has increased from 154 in 1981, to 437 in 1986 (Texas Parks and Wildlife, 1981; 1986). This represents a 284 percent increase despite a decrease in the total number of boats from 2664 to 1795 during these same years. Historically, owners of vessels greater than five net tons had to be U.S. citizens to obtain documentation. Consequently, most Vietnamese shrimpers were restricted to the inshore waters. A recent policy change may cause a shift in this ethnic profile by enabling more Vietnamese to enter the offshore fishery. In 1987, a modification of the documentation laws was implemented. Rather than requiring shrimpers to be United States citizens to operate vessels in the Federal Conservation Zone, Vietnamese shrimpers need now only sign a document of intention to become a United States citizen (U.S. Justice Department, 1987). Once this document is signed, they are able to acquire licenses to operate vessels over five net tons.

Description of the Fishery

Commercial shrimping in Galveston Bay is accomplished exclusively by trawling. Most of the boats in the inshore fishery are between 21 and 40 feet (see Figure 4). Larger boats (greater than 40 feet) represent the least frequently

used vessel size in Galveston Bay since they tend to fish exclusively offshore. As vessel size increases, so does the captain's dependency on shrimping as an occupation.

The inshore fishery of Galveston Bay is spread around the perimeter of the bay. The only public docking facility is located in the City of Galveston, at Pier 19. Thus, price is the reason why many (54 percent) of the shrimpers who were interviewed at Pier 19 chose to land their shrimp at a particular shrimp house. There are two shrimp houses situated adjacent to each other that service the boats at Pier 19: one is operated by a man whose father began what at the time (1920s) was the first independent shrimp house in Galveston; the other is operated by recent immigrants. The relationship between the two shrimp house owners is one of indifference; very little communication between the two occurs. The shrimpers who dock their boats at Pier 19 have no obligation to sell their shrimp to either house, although if they do they tend to be loyal to one dealer. Except on rare occasions, the only transaction that occurs is money for shrimp. The shrimpers at the public dock are ethnically diverse, including Black, Italian, Hispanic, Vietnamese, and Anglo. The relationships between the shrimpers are cordial; they help each other with engine maintenance, net repair, fishing hints, etc. As a group, they fish independently, but some break into small groups and fish in the same vicinity. They seem to be the sole shrimpers in the Galveston Channel,

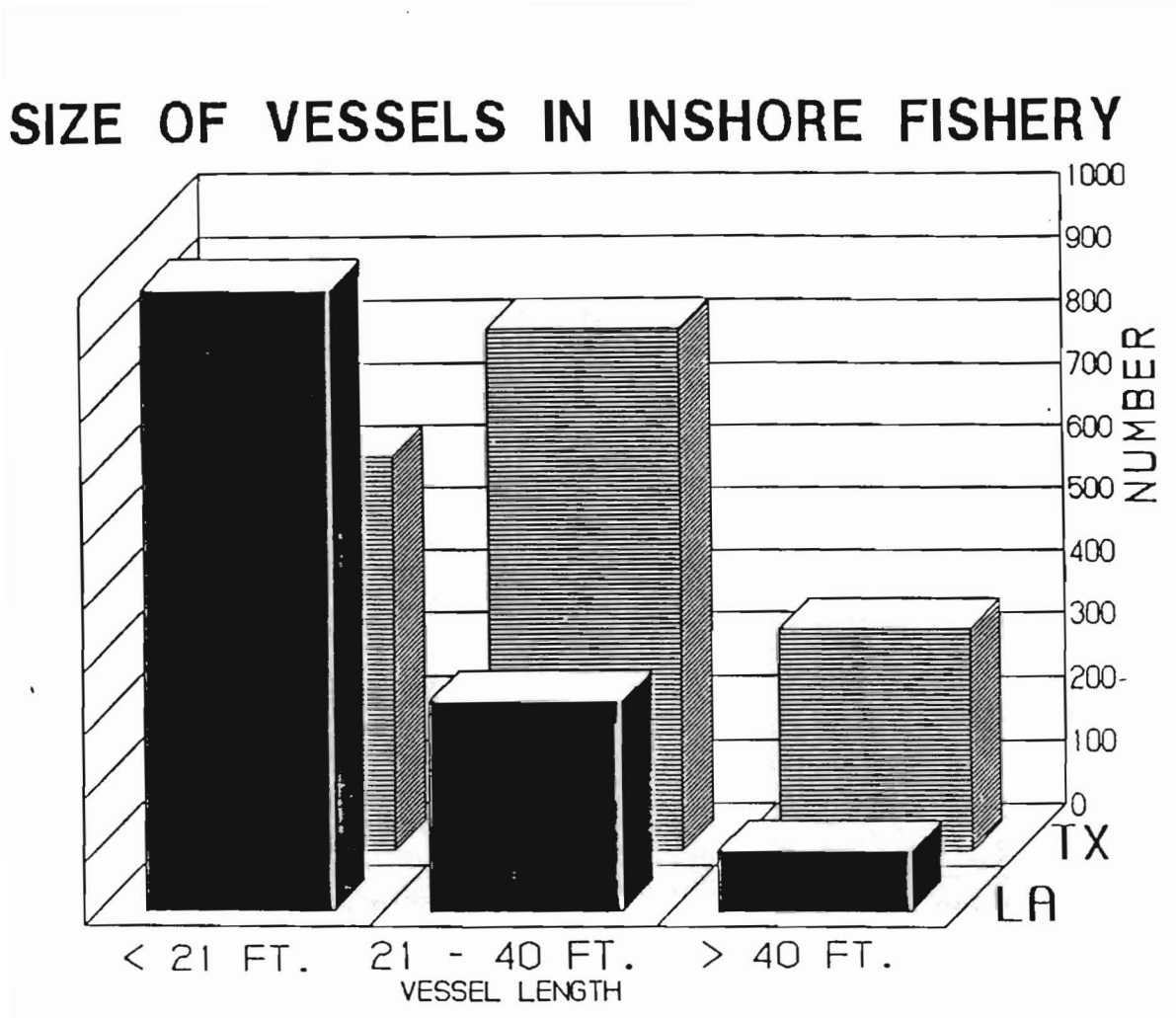

Figure 4. Vessel size of inshore fisheries of Galveston Bay and Calcasieu Lake.
Source: License lists from Texas Parks and Wildlife and Louisiana Department of Fisheries and Wildlife.

located near their dock space, but otherwise disperse to all areas of the bay.

Moving westward along Galveston Island one finds a few isolated patches of shrimp boats. These patches tend to be ethnically homogeneous; either all Anglo or Vietnamese. Dickinson is the next major center for shrimp along the Bay, situated directly south of Texas City. A local family has operated a shrimp house and marine supply shop in Dickinson since the mid 1930s. Shrimpers who utilize this facility are both Anglo and Vietnamese. Integration in this region has occurred largely because the marine supply store is one of only a few located around the bay. The Vietnamese, therefore, are very dependent upon this business and require much assistance from the store owners. A mutual dependence and trust, therefore, has developed between the business owners and Vietnamese shrimpers (Galveston Bay marine supply store owner, 1987). The Texas City Dike is the locus of the shrimp docks in Texas City and is heavily used for recreational fishing. Consequently, the shrimpers shrimp mostly for the bait camps that sell live shrimp to recreational fishermen. The many bait camps on the Texas City Dike are owned by a few families. Shrimpers tend to shrimp in the vicinity of the Dike to ensure delivery of live shrimp to the bait camp. They seem to be very territorial and have displayed hostility towards shrimpers from other areas of the bay who shrimp near the Dike particularly the

Vietnamese who according to American shrimpers have little regard for one's shrimping space. Their ethnic complaints are well known in the area and are documented in the literature (Starr, 1981). Respect for one's fishing space and the informal rules governing shrimping is particularly evident along the Texas City Dike. The marine extension agent of Galveston Bay commented:

"...with all these bait camps along the Dike, they drag this thing, they get in line and they drag, and if you get in their way they'll just run you over, or they'll know who you are and they'll be looking for you later on (1987)."

While the shrimpers docking at Texas City noted a wide range of reasons for choosing to land their shrimp at a particular shrimp house, the most frequently noted response was the convenience of the shrimp house to the fishing grounds (36 percent).

The docks along the western side of the bay in Baycliff, Kemah, and Seabrook are heavily dominated by the Vietnamese. Shrimp houses are owned by Vietnamese, their shrimpers are entirely Vietnamese, and the workers at the shrimp houses are Vietnamese, Hispanics, and Blacks. It is very rare in Galveston Bay for American shrimpers to sell to Vietnamese shrimp house owners. One of the Vietnamese shrimp house owners hired an American to run one of her many shrimp houses to attract native shrimpers. Most of the Vietnamese owned shrimp houses have markets that cater to Vietnamese clientele. The relationship among the Vietnamese shrimp

house owners is one of either independence or hostility. As a community, the Vietnamese are not unified; the strong social class differences that existed in Vietnam continue to exist in the United States as well. Thus, Vietnamese shrimp house owners were most likely businessmen or professionals in Vietnam, whereas shrimpers were laborers or fishermen and tend to be uneducated. Some Vietnamese fishermen, however, were government officials who, unable to speak english, cannot pursue similar careers in the United States. Because of the family nature of the Vietnamese business operations, it is not surprising that shrimpers interviewed along the western side of the bay listed services offered by the shrimp house as the primary reason for landing their shrimp at a particular shrimp house (61 percent). Services may include extension of loans, free dock space, credit, ice and fuel at low prices, and coverage of fines from shrimping violations.

The northern part of Galveston Bay has very few access points and is void of docks until one reaches the town of Anahuac situated on the northeastern side of the Bay. Anahuac southward to Smith Point is a rural area where many Vietnamese immigrants have settled. The village of Double Bayou, situated between Anahuac and Smith Point, has four fish houses owned by prominent longstanding families in the shrimp business. One house is primarily an oyster house without docking facilities. The shrimpers at one of two other docks are entirely Anglo, and at the other, half Anglo

and half Vietnamese. The shrimp house owner with Vietnamese shrimpers has assumed somewhat of a maternal responsibility for her Vietnamese shrimpers in that she handles all of their personal financial and legal transactions. Many American shrimpers are sensitive to the family nature of Vietnamese shrimpers and recognize that if they dissatisfy one member of the fleet, they are likely to lose the business of all other members. The fourth shrimp house is a small bait house that is serviced by its own boat. The shrimpers who reside in the area of Double Bayou and Anahuac fish primarily in Trinity Bay. Smith Point is the major center for the oyster fishery and little shrimping occurs there.

The location of shrimp activity on the southeast-ern part of the bay is in Boliver which is the home port of the offshore fleet. The boats are large and the shrimpers are both native and Vietnamese. Little time was spent at Boliver since it services primarily offshore boats.

Outside of Galveston, there is a strong bond between the shrimpers and the shrimp house owners. The owners frequently extend loans to shrimpers and, in turn, rely on the shrimpers to unload all their shrimp at their shrimp houses. Often, however, this backfires and the shrimp house owners suffer losses when shrimpers change docking facilities without reimbursing the shrimp house owner. The relationship between shrimpers and shrimp house owners with respect to financial loans exists because most inshore

shrimpers are unable to obtain loans from banking institutions since few captains can afford insurance. The dealer is very important to the shrimper in another respect as well. In that the dealer is aware of the supply in the processing plants, he/she is able to inform shrimpers when it is most advantageous to "push" their shrimp. "Pushing" shrimp refers to packing smaller shrimp in a crate than what it is labeled. This is encouraged by dealers when incoming supply is high and the chance of being caught is low because both the shrimper and shrimp house owner profit from successfully pushing shrimp. If caught, it is the shrimper who pays the fine (Galveston Bay shrimp house owner, 1987). This type of relationship between shrimper and shrimp house owner is relatively stable outside of the City of Galveston. Prices do not seem to fluctuate widely, and the added benefits offered by shrimp house owners outweigh price incentives.

Marketing and Distribution

Due to the urban environment surrounding Galveston Bay, it is not surprising that much of the shrimp harvested from inshore waters remains in the community and arrives there by a number of different avenues (see Figure 5). From the survey results, 36.7 percent of the shrimp harvested by shrimpers bypassed the shrimp houses and were sold directly

Figure 5. Marketing and distribution of shrimp harvested in Galveston Bay and Calcasieu Lake.
Source: Survey Data.

from boats to tourists and peddlers, used for personal consumption, or sold to bait camps, while the remaining 63.3 percent were sold to shrimp houses. Further, the shrimp houses sold most of their product to local markets with only 33.2 percent of the shrimp reported to be sold directly to processors by shrimp houses. Rather, the shrimp houses, overall, reported that 47 percent of their product sold to individual customers, 5.3 percent to peddlers, 4.7 percent to other dealers, and 3.3 percent to stores and restaurants. These results are averaged between the spring and fall seasons, and thus do not amount to precisely 100 percent. The existence of diverse local markets can strain the shrimper-shrimp house relationship. Tourists and the local population offer shrimpers higher prices for shrimp than the shrimp house can offer. Hence, when an opportunity arises shrimpers have been known to sell the small shrimp to the shrimp house and return at night to unload the larger more profitable shrimp for his/her own customers (Galveston Bay marine extension agent, 1987).

The shrimp houses are heavily dependent upon shrimp harvested from inshore waters for their product. Shrimp house owners reported that, overall, 83 percent of the shrimp passing through their houses came from Galveston Bay during the spring season compared to 97 percent during the fall season. Of the 21 dealers interviewed around the perimeter of Galveston bay, 17 (81 percent) were integrated with

another aspect of the fishery owning commercial shrimp boats and/or retail fish stores; 13 (62 percent) owned boats; 12 (57 percent) owned stores; and 8 (38 percent) owned both boats and stores. None, however owned processing plants. Four (19 percent) of the shrimp house owners interviewed reported owning more than one shrimp house.

Demographic Trends

The trends within the Galveston Bay fishery described in this section are extrapolated from the survey results. Overall, 62 percent of the shrimp captains are fully dependent on shrimping for their income. In addition, the age distribution is such that the greatest number of captains are between 51 and 60 years old (See Figure 6). The fact that so many fall into this age group indicates that overall little growth is occurring in the fishery. This is substantiated by the reduction in the number of American owned boats indicated from the list of licenses supplied by the Texas Parks and Wildlife Department (1981, 1986). Many of the American shrimpers noted this trend and commented on the hesitancy of native shrimpers to enter the fishery because of the heavy competition presented by their Vietnamese counterparts who "shrimp hard." This means they take relatively few days off and shrimp long hours. The greater effort by the Vietnamese shrimpers could not be substantiated by the survey results since only 12 Vietnamese

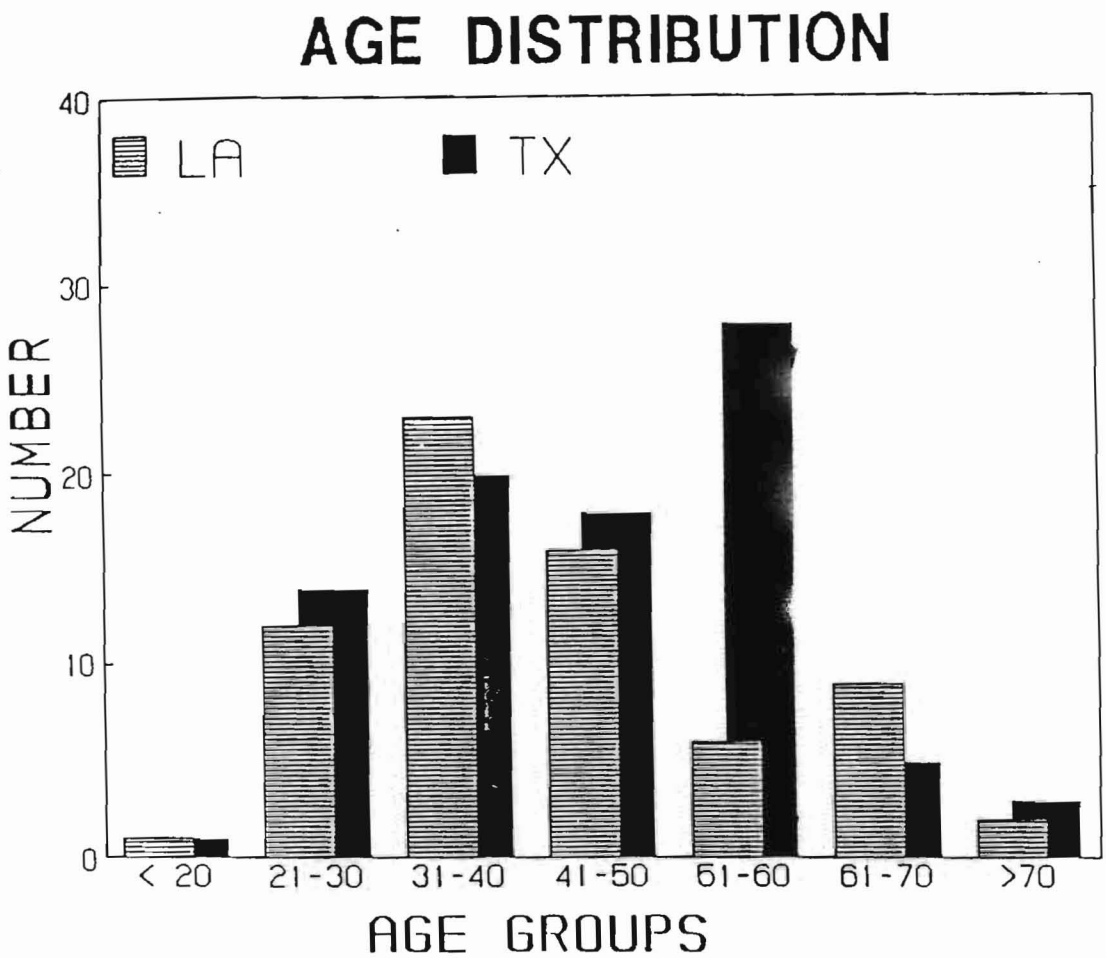

Figure 6. Age distribution of inshore shrimpers.
Source: Survey results.

shrimpers were interviewed. In an attempt to compare effort of native and non-native shrimpers, the perceptions of the native shrimpers regarding effort is not substantiated (see Table 3).

Most (70 percent) of the shrimp captains reported coming from a family in which at least one member was a shrimper (see Figure 7). This suggests that in Galveston Bay shrimping, for the most part, is an occupation into which one has been introduced by family. This is supported by the results indicating that of those captains who employ deckhands, 58 percent employ relatives, and 42 percent use friends or hired labor.

The majority of shrimpers (60 percent) completed between nine and twelve years of schooling. Of the remaining 40 percent, 22 percent completed less than nine years of schooling, and 18 percent pursued education beyond high school including trade school or college. The employment history of the shrimpers from Galveston Bay show a heavy loading in the manufacturing sector, but reflect a wide diversity of occupational skills. Employment opportunities in the surrounding communities, coupled with the competition of Vietnamese shrimpers who are often unable to pursue alternative land based occupations may account for the reduction in the number of native shrimpers in the Galveston Bay fishery.

Table 3. Ethnicity by effort among Galveston Bay shrimpers.

DAYS/WEEK	**ETHNICITY**		
	Native	Non-Native	Total
0-1	5 (10.8%)	0 (0%)	5 (7%)
2-4	12 (26%)	5 (20%)	17 (24%)
5-7	29 (63%)	20 (80%)	49 (69%)
Total	46 (65%)	25 (35%)	71

n=71; missing cases=12; chi square=3.64; df=2; p>.05;

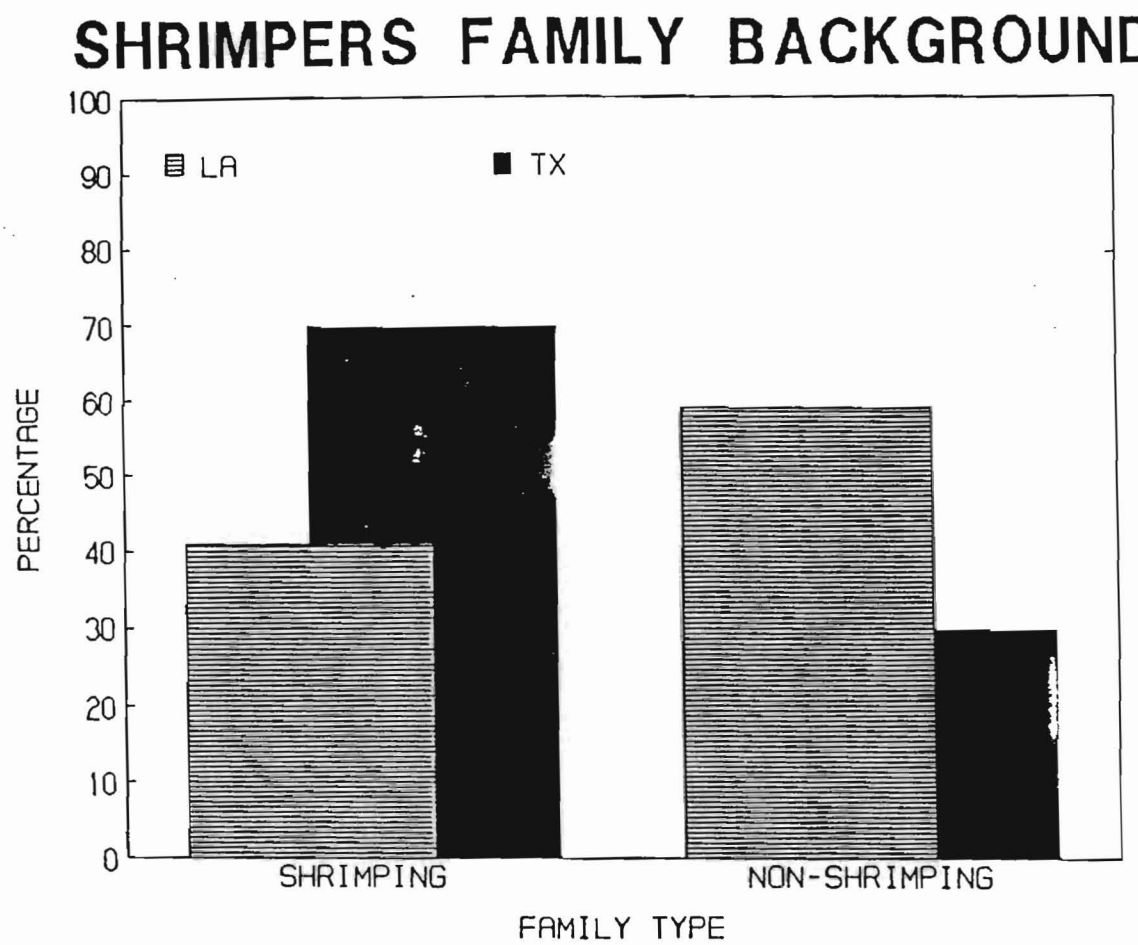

Figure 7. Family background of shrimpers in Galveston Bay and Calcasieu Lake.
Source: Survey Data.

The responses from the population of deckhands supports many of the trends reflected by the responses of Galveston Bay shrimp captains. Only 38 percent of the deckhands reported to work for family members. While 50 percent stated that they wished to pursue shrimping as their future occupation, many of these respondents were older Vietnamese immigrants who had few alternatives outside of fishing. Regarding employment histories, most deckhands were skilled in such jobs as machinists, cooks, waitresses, carpenters, pile drivers, construction workers, welders, surveyors, etc. Of those deckhands who expressed a desire to pursue an alternative occupation (50 percent), those occupations cited were those of a studio musician, small business owner, lawyer, welder, and cosmetologist. It is apparent that the urbanized areas surrounding Galveston Bay offer a diverse set of alternatives for those who are dissatisfied with shrimping, making exit from the fishery very feasible if one has not made a substantial capital investment.

Governance

Commercial fisheries in Texas are regulated by the Texas Parks and Wildlife Department. Texas commercial shrimpers may hold any combination of three licenses: bay, bait, or gulf (Texas Parks and Wildlife Department, 1987). The use of the bay and bait licenses represents the inshore

fishery, and their use is confined to harvesting shrimp in the non-nursery estuaries of Texas. The gulf license is necessary to harvest shrimp in Gulf of Mexico waters outside the three fathom depth zone (Texas Parks and Wildlife Department, 1987).

The management of the commercial bay fishery is regulated with season closures and gear restrictions. During the spring season, from May 15 to July 15, shrimpers harvesting with a bay license may trawl with a net no wider than 32 feet between doors. In addition, mesh size may not be less than six and one half inches in length between the two most widely separated knots in any consecutive series of five stretched meshes. Fishermen are limited to a daily catch of 300 pounds, and permitted to shrimp between sunrise and sunset (Texas Parks and Wildlife Department, 1987). These current regulations ensure that a sufficient amount of brown shrimp migrate offshore.

During the fall season, the bay regulations target the optimal size of bay white shrimp. During the first part of the fall season, from August 15 to October 15 when inshore shrimpers harvest white shrimp, bay shrimpers may harvest an unlimited amount of shrimp, however they are restricted by a size limit of 50 heads-on shrimp to the pound. Hence, shrimpers are permitted to use a larger net with a 95 foot span between trawl doors for increased poundage, but are restricted to a larger mesh size not less than eight and

three quarters inches between the two most widely separated knots in any consecutive series of five stretched meshes, to enable escapement of smaller shrimp. After October 15, there is no size limit on shrimp harvested in Texas waters within seven fathoms, and restrictions on net mesh size are relaxed. Shrimping with a bay license is prohibited during the one month closure between the spring and fall seasons. Thus, the regulations allocate the more highly migratory brown shrimp primarily to the offshore fishery, and the less migratory white shrimp to the inshore fishery. Both management regimes target the larger more valuable shrimp.

The commercial bait shrimp fishery is a year round fishery catering to recreational fishermen. The more common species caught by recreational fishermen include flounder, spotted sea trout and red drum. Recreational fishing is an extremely lucrative industry in Galveston Bay generating an estimated $133.2 million per year (King and Kendall, 1987), representing one half of sport fishing expenditures in estuarine systems along the Texas coast (Ditton et. al, 1988). Those shrimping with a bait license may harvest a daily catch of 200 pounds, one half of which must be kept alive, except from August 16 to November 15 (Texas Parks and Wildlife Department, 1987). Bait shrimpers must keep one half of their catch alive because sport fishermen require live shrimp for bait. Unlike the bay fishery, the bait fishery is not restricted by the time of day, nor the season

closure; a modification implemented when the Texas Closure went into effect. Consequently, many shrimpers hold both a bay and bait license to take advantage of the more lenient restrictions of the bait license during the season closure. This is evidenced by the increase in shrimpers holding a bait license in conjunction with a gulf and/or bay license from 28 percent to 41 percent between 1981-1987 (Texas Parks and Wildlife Department, 1981; 1986). Increased participation in the bait fishery has occurred despite a corresponding decrease in landings by Galveston Bay anglers (Osburn and Ferguson, 1986).

Calcasieu Lake

Physical and Social Environments

Calcasieu Lake is accessible to Galveston Bay and all other estuarine systems along the Gulf by way of the Gulf Intracoastal Waterway. Calcasieu Lake is much smaller than Galveston Bay, extending two miles wide and three miles long at its most distant points (see Figure 8). It is connected to the Gulf by a narrow channel known as Cameron Pass which is bordered by the fishing port of Cameron, Louisiana, the name of the town being derived from the term for "shrimp" in French. Shrimp vessels serving offshore vessels are, for the most part, located along the banks of Cameron Pass. The upper portion of Calcasieu Lake is characterized by an extensive network of bayous with marshlands providing nursery

areas for juvenile shrimp. Thus, the perimeter of Calcasieu Lake is not as clearly defined as it is around Galveston Bay. Shrimp houses and boats utilized in the inshore fishery are located in patches along the channels in the upper portion of the lake and in West Cove.

Similar to Galveston Bay, Calcasieu Lake is heavily utilized for shipping. Located at the head of Calcasieu Lake is the Port of Lake Charles, the largest port of export for rice in the United States (Lake Charles Chamber of Commerce, 1987) and the ship channel from the Gulf to Lake Charles runs through Calcasieu Lake. Yet even with this similarity with Galveston Bay, the economy surrounding Calcasieu Lake is not as diverse with respect to employment opportunities. Besides Lake Charles, the small communities of Hackberry, Holly Beach, and Cameron are the only population centers bordering the lake. Many shrimpers, however, reside in the communities of Sulphur and Vinton each within a 50 mile radius of the lake. The two most important employers in the area are the fishing and petroleum industries. Currently, 25 percent of Cameron's civilian labor force are employed in the fishing industry (Lake Charles Chamber of Commerce, 1987). The significance of fisheries to the local economy is evident in that the majority of the population of Holly Beach are seasonal labor from northern areas such as West Virginia who work in the menhaden plant when the menhaden season is open.

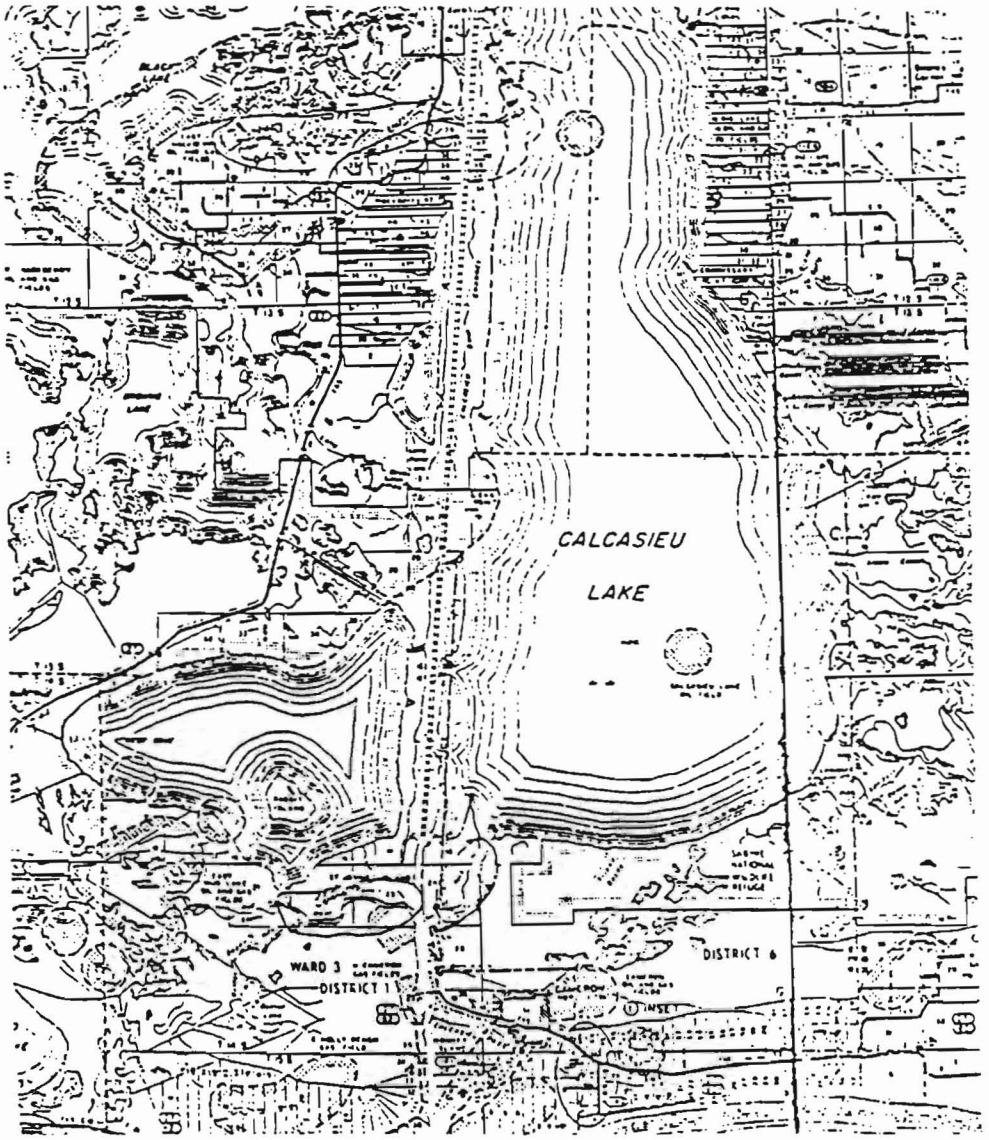

Figure 8. Calcasieu Lake
Source: Louisiana Department of Highways and Transportation, 1983.

One shrimper commented that:

"Right now if they was to shut it (inshore waters) down it would be the biggest disaster because there is no work no work no work...You got 40, 60, 100,000 tied up in your boat, what you goin to do with the boat? You can't even sell it - who's goin to buy it? For what? You just stuck. Most likely you just goin to have to move out of this area."

Expansion of the inshore fishery has parallelled a decline in the petroleum industry due to the lack of industrial diversity in the region (Peret, quoted in Petty, 1986). In contrast to Galveston Bay, Calcasieu Lake is surrounded completely by Sabine National Wildlife Refuge and rural communities heavily dependent on farming (rice, soybean), hunting (nutria, alligator, and duck), and fishing (shrimp, redfish, speckled trout, menhaden, and crabs).

Calcasieu Lake is surrounded by two parishes, which are comparable to counties: Cameron and Calcasieu Parishes. Calcasieu Parish has an estimated 1986 population of 175,419, with 34 percent of its population living in rural communities. The 1985 estimated per capita income in Calcasieu Parish was $10,117. Cameron Parish is the largest parish in southwest Louisiana, geographically, yet the most sparsely populated with an estimated 1986 population of 9,861. It has no incorporated communities, and as a result, much of its land is still undivided and undevelopable. The largest proportion (25 percent) of the population of Cameron parish are employed as operative and blue collar workers. Cameron Parish also has the largest percentage of employees

in farming, fishing, and forestry representing 7.8 percent of its population (Lake Charles Chamber of Commerce, 1987). The counties surrounding Calcasieu Lake have experienced steady growth since the 1920s except for a no-growth period from 1960 to 1970 (see Figure 9).

The populations in these rural areas are much more ethnically homogenous than those surrounding Galveston Bay. According to the most recent census, only 0.6 percent of the population is made up of ethnic minorities other thanfishery reflects this ethnic homogeneity in that most of the inshore shrimpers are of Anglo and Cajun descent. When asked why the Vietnamese did not establish a presence in the inshore fishery, many shrimpers remarked that "they tried, but we kicked them out back in '81." This illustrates the informal control on entrance into the fishery by outsiders.

Description of the Fishery

In contrast to the shrimp fishery in Texas, Louisiana's is dominated by small inshore boats. Of the 37,000 commercial shrimp licenses issued in 1986, only 2,000-3,000 were issued to offshore vessels. The inshore shrimp fishery of Calcasieu Lake reflects this in that the majority of the inshore boats are less than 21 feet in length reflecting a noticeable contrast to Galveston Bay's inshore fishery (see Figure 4, p.39).

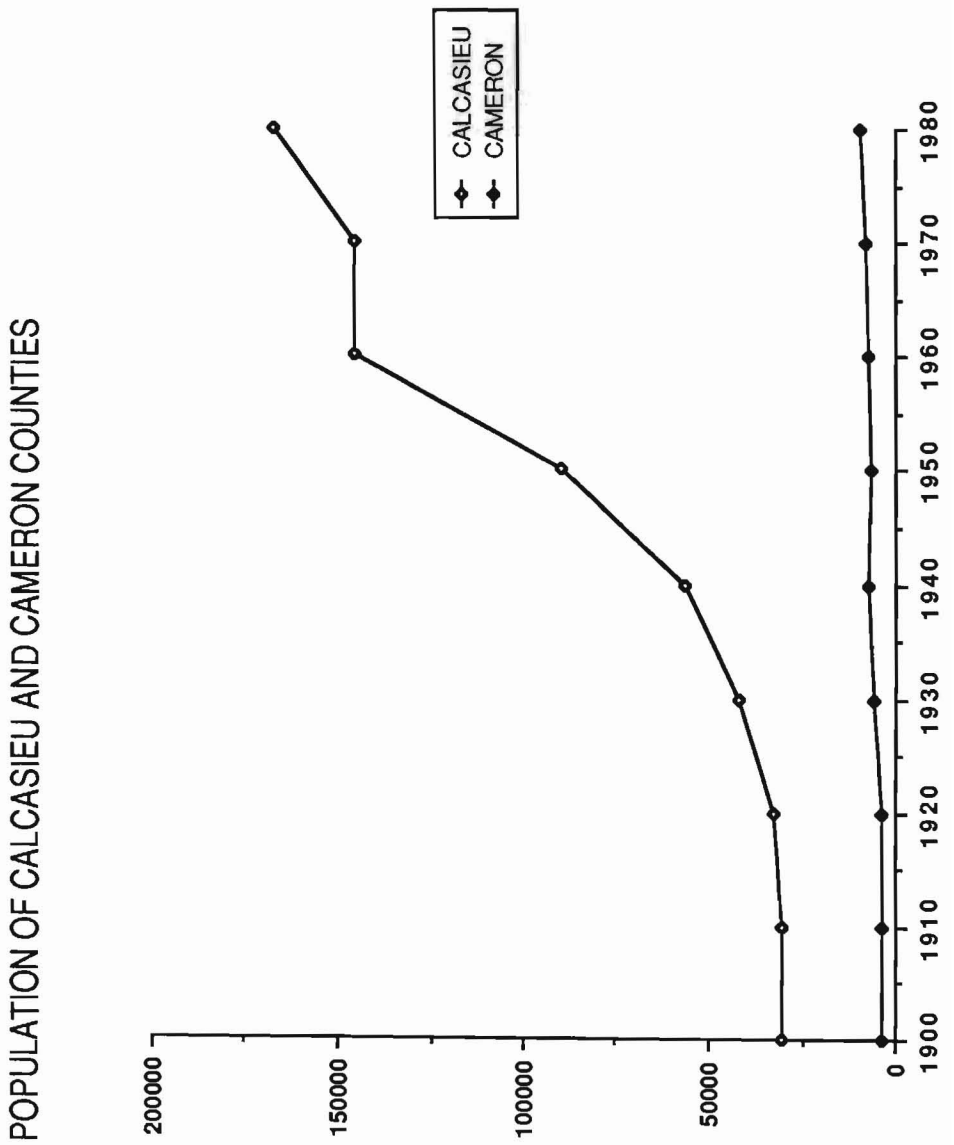

Figure 9: Calcasieu Lake Population by Counties
Source: US Bureau of Census

Although there are inshore shrimp houses scattered along the many bayous meandering along the upper reaches of Calcasieu Lake, most are located in the area of Hackberry and West Cove. There are a total of five shrimp houses in these two areas combined. Limited access to the water around the bay accounts for this regionalization of the fishery. Cameron is port for the offshore vessels. Dock space is very limited in this area when the oil industry is active. Otherwise, dock space is readily available. West Cove is the small inlet located on the lower west part of Calcasieu Lake. This is home to approximately 15 small boats under 21 feet in length. A mixture of inshore shrimpers shrimp out of West Cove; young brothers who invested in a boat together, an elderly minister and his wife, and migrant shrimpers from other areas in Louisiana who live in small trailers. Their shrimping operations occur almost exclusively in the channel that runs by West Cove. Moving northward to Hackberry, one finds a cluster of four shrimp houses, three owned by native residents and one owned by a Chinese immigrant. The presence of the immigrant was very controversial, not only because of his ethnicity, but because he installed a processing plant adjacent to his shrimp house. The price differential that could be offered by someone who owned a processing plant was enough incentive to unload where price, rather than loyalty, dictated. When asked whether loyalty or price determined

where a shrimper would land his harvest, one shrimp house owner commented:

"they will jump the fence. I got a few of them that wouldn't leave; 75 percent of them, they'd go. They want it all. They don't want you to have nothing."

Likewise, the owner of the processing plant commented:

"...Locally when we have a price war, like I want to get more product, I raise my boat price a nickel. (There are price wars) always, constant."

On a few occasions it was observed that a shrimper halted his unloading operations upon hearing of a better offer next door. What has occurred as a result of the competitive advantage of the shrimp house/processing plant merger is that the other shrimp houses have become highly interdependent. One of the other shrimp houses buys all of the product from two of the remaining three and brokers the shrimp to a processing plant outside of the region (Calcasieu Lake shrimp house owner, 1987).

Marketing and Distribution

The inshore shrimp fishery of Calcasieu Lake is very much tied into the offshore markets in that both are destined for processing plants (see Figure 5, p.45). Therefore, most of the shrimp harvested by inshore shrimpers are sold to shrimp houses, which in turn, sell most of their product outside of the community. Approximately 80 percent of the shrimp harvested were sold to the shrimp houses. Of that, approximately 76 percent of the shrimp distributed by

the shrimp houses are sold to processors. Brokers and dealers are the recipients of the remaining 24 percent. The remaining were used for personal consumption. More shrimp were used for personal consumption among Calcasieu Lake shrimpers than Galveston Bay shrimpers. This occurs because the value of shrimp caught in Calcasieu Lake is much less than that in Galveston Bay, and shrimp in Calcasieu Lake is more necessary for subsistence and trading purposes than in Galveston Bay.

The Calcasieu Lake shrimp houses, like those in Galveston Bay, are integrated with other sectors of the industry including harvesting, retail, and processing. The shrimp houses depended heavily upon shrimp harvested from inshore waters with 89 percent of their product coming from the lake.

Demographic Trends

A noticeable difference in the social makeup of the fishery in Calcasieu Lake was the presence of women and young couples. There were many wives who accompanied their husbands, and women who were deckhands for other shrimpers. One shrimper explained that his daughter was terminating her land-based job to learn how to captain his boat.

Slightly more of the captains (67 percent) employed relatives on their boats in Calcasieu Lake than in Galveston Bay. The responses of the deckhands supported this

observation as well, with 57 percent reporting to work for family members compared to 38 percent of their Galveston counterparts. A slightly larger proportion of deckhands in Calcasieu Lake (57 percent) expressed an interest in being a shrimp captain in the future compared to those from Galveston Bay (50 percent). Many of the Calcasieu Lake deckhands entered the fishery as a result of being layed off from oil industry related jobs and from lack of work in the construction industry. This accounts for the high concentration of job skills in the occupations of welding, pipefitting, carpentry, crewboat operator, assistant manager of drilling operations, deckhand of crew and supply boats, roofing, etc... Those deckhands desiring to pursue careers other than shrimping in their future (43 percent) listed the following occupations: work in the oil fields, construction, welding, rodeo, gambling, and selling real estate. As among Galveston Bay deckhands, their aspirations are largely determined by alternative opportunities in their surrounding environment. This observation supports those made by the local marine extension agent that the inshore shrimp fishery is, in fact, an important supportive industry in the region when the oil and construction industries are economically unproductive (1987).

Interestingly, only 54 percent of the shrimp captains reported to rely solely on shrimping for their income. It is somewhat surprising that fewer shrimpers in Calcasieu Lake

were completely dependent upon shrimping in comparison to their Galveston counterparts. It seems, however, from the survey results and from personal interviews that shrimping in Calcasieu Lake is an occupation that one relies upon when work in other occupations is scarce, or seasonal. Many shrimpers entered the fishery within the last ten years coinciding with the slump in the oil industry of the mid 1970s. The occupational histories of most of the shrimpers in this region were much less diverse and more heavily weighted to manufacturing occupations than those of the Galveston Bay shrimpers.

In contrast to the Galveston Bay shrimpers, the majority of shrimp captains in Calcasieu Lake were between 31 and 40; two decades younger than their Galveston counterparts (see Figure 6, p.48). This age distribution reflects a growth in Calcasieu Lake's inshore fishery. The recent significance of the fishery to the local economy is further supported by the response that only 41 percent of the captains came from shrimping families. This, in contrast to Galveston Bay shrimpers, seems to indicate that economic reasons, rather than sociocultural factors, are fueling the growth in Calcasieu Lake's inshore fishery.

Fewer of the Calcasieu Lake shrimpers received a high school education than Galveston shrimpers, with 44 percent of Calcasieu Lake shrimpers completing between nine and twelve years of school. Of the remaining 54 percent of the

Calcasieu Lake shrimpers, 32 percent completed less than nine years of school and 24 percent pursued a trade school or college education. The differences in the numbers of shrimpers from both Galveston Bay and Calcasieu Lake who have received different levels of education are not statistically significant. This suggests that the differences are likely due to chance (see Table 4).

Governance

The inshore shrimp fishery in Louisiana is regulated by season closures that roughly approximate those in Texas. There is a spring and fall season separated by a month long closure. However, there are five fundamental ways that Louisiana's management of the inshore shrimp fishery differs from that of Texas. First, Louisiana's closure between the spring and fall season is complete; due to the lack of a developed tourist industry around Calcasieu Lake, there is no demand to support a bait shrimp fishery. Second, size restrictions are lenient. Shrimpers are permitted to harvest heads-on shrimp greater than 100 count to the pound. Third, Calcasieu Lake inshore shrimpers may catch an unlimited amount of shrimp during the day or night in both the spring and fall seasons. Fourth, opening day of the fall season occurs on the third Monday in August; rather than managing the opening on the basis of biological indicators as in Texas. Louisiana adheres to an archaic law whose rationale

Table 4. Distribution of Galveston Bay and Calcasieu Lake shrimpers by education level.

Education(years)	Galveston Bay	Calcasieu Lake	Total
Less than 8	15 (22%)	29 (32%)	44
9-12	41 (60%)	40 (44%)	81
more than 12	12 (18%)	22 (24%)	34
Total	68	91	159

n=159; missing cases=1; chi square=4.2; d.f.=2; p>=.05.

today is unknown among shrimpers and managers alike. Fifth, Louisiana shrimpers are licensed according to the gear they use which varies depending on daytime or nighttime usage (West's Louisiana Statutes Annotated, 1987).

Unlike Galveston Bay gear restrictions, Louisiana shrimpers shrimp with both trawl nets and butterfly nets (West's Louisiana Statutes Annotated, 1987). Louisiana shrimpers may purchase trawl licenses for day shrimping and butterfly net licenses for night shrimping. The frames of butterfly nets range in size from 12 x 8 feet to 12 x 16 feet on mobile structures. On stationary structures single nets 22 x 22 feet or double nets 12 x 12 feet are permitted. Since success with butterfly nets depends on the strength of the tides, the intensity of night shrimping fluctuates with the lunar cycle. Fishing effort with butterfly nets, therefore, peaks every two weeks for seven days lasting from three days before to three days following the two extremes of the lunar cycle.

Trawling occurs in the open portion of Calcasieu Lake, whereas the use of butterfly nets is limited to the narrow channels leading into and extending from the Bay. Many shrimpers hold both a saltwater trawl and butterfly license. This enables them to participate in both the daytime trawl and nighttime butterfly fisheries. The use of butterfly nets is also convenient for those employed in other jobs with cyclical work schedules such as those in the oil

and construction industries (Edwards, 1986). Louisiana prohibits the use of butterfly nets by non-residents who are not permitted to use this type of gear in their home states (Fishery Regulations, 1987). Thus, Texas shrimpers are prohibited from this sector of Louisiana's inshore shrimp fishery. This reflects a formal control on outsiders from a fishery suffering diminishing economic rents as more effort continues to be exerted on small shrimp.

Due to both the shape of the narrow bayous and the method of butterfly shrimping, space is less protected by individual groups in Calcasieu Lake than in Galveston Bay. Rather, there are commonly accepted rules that govern behavior such as lining up downstream to push in an orderly procession upstream. Shrimpers in Calcasieu Lake move easily to various fishing locations. Further, the loyalty between the shrimper and shrimp house that one finds in Galveston Bay does not exist in Calcasieu Lake. This may occur because: 1) many shrimpers are migrants from inland Louisiana and haul their boats to their trailers at the end of their trips; 2) some shrimpers tie their boats to poles that they set along a channel; and 3) prices are very competitive, seemingly more so than in Galveston Bay. Since Calcasieu Lake shrimpers are much more independent in their shrimping operations and their ties to shrimp houses, they do not exhibit intra-territorial behavior as a group; rather, they are exclusive to outsiders. They seem to defend Calcasieu Lake against shrimpers from

other regions, much like the Maine lobstermen who work within perimeter defended territories (Acheson, 1975). Galveston Bay shrimpers seem to be less exclusive to shrimpers outside their bay, but shrimp in smaller territories that correspond more closely to Acheson's nuclear defended territories.

Summary

From the above descriptions of the two study areas, a number of comparisons and contrasts can be made which may influence how each population perceives itself to have been impacted by the Texas Closure. First, Galveston Bay is much larger, more urbanized, and more heavily utilized than Calcasieu Lake. The dispersement of the fishery around such a large perimeter shapes the nature of the fishery in many ways.

First, the size and ethnic diversity of Galveston Bay makes political and social solidarity of the shrimpers as a whole difficult. Rather, the evolution of smaller less defined territories is likely to occur. In contrast, shrimpers in Calcasieu Lake defended the entire Lake from outsiders. Second, The presence of so many shrimp houses in Galveston Bay is likely to result in relatively minor price differentials offered by shrimp houses. It was observed, for example, that in Galveston Bay services seemed to be a determining factor in landing shrimp, whereas in Calcasieu Lake, price was more influential. Third, the accessibility of the markets around Galveston Bay enables most of the product to remain in the local community. On the other hand, Calcasieu Lake shrimp tends to leave the community at a low level in the industry's foodweb. It also means that the markets for the offshore and inshore fisheries of Calcasieu Lake are similar once the product leaves the community.

How might this influence each population's perception of the Texas Closure? Since Calcasieu Lake is much smaller than Galveston Bay, perimeter defended, surrounded by an economy with very limited employment alternatives, and whose inshore fishery shares the same market as its offshore fishery, one might expect that fleet displacement from Texas during the Texas Closure may impose a threat to Calcasieu Lake inshore shrimpers.

However, much of Calcasieu Lake is physically and legally inaccessible to the large offshore Texas boats likely to be displaced by the Texas Closure. In addition, it has been observed that Texas boats tend to land their shrimp in Texas, and Louisiana boats land their shrimp in Louisiana regardless of where the shrimp were harvested (Gulf Fisheries News, 1989). Given this situation, market competition is not enhanced by the Texas presence during the Texas Closure. It is for the above mentioned reasons that it is expected that the Texas Closure will be perceived to have had little impact on Calcasieu Lake's inshore shrimpers.

Galveston Bay's fishery is less exclusive to outsiders in the sense that small niches develop under the pressure of competition. When there was intense hostility directed at the Vietnamese newcomers, the Vietnamese and native shrimpers merely established their own niche. In addition, Galveston Bay is large and many parts of the Bay can handle the presence of offshore boats displaced by the

Texas Closure that are small enough to profit from pulling only one trawl. Displacement of the fishery is not as threatening as it is in Calcasieu Lake since there are a number of employment opportunities in the surrounding economy, and many native shrimpers seem to be opting for that route.

In consideration of the physical parameters of each bay, the social infrastructure of each fishery, and the surrounding political and economic environments, it is hypothesized that both populations of shrimpers will perceive themselves to be affected by the Texas Closure differently. Their ideological beliefs and perceptions are influenced by very different social systems. However it is hypothesized that they will perceive themselves to be impacted by the Texas Closure in the same way that they have perceived themselves to have been impacted by the state closure. Each fishery has become accustomed to the Texas state offshore closure since 1959. It is unlikely that the closure of waters from 9-200 miles in the Gulf would directly influence either population. Consequently, it is expected that opinions regarding support for the Texas Closure will be consistent with opinions expressed regarding the state closure. The assumption behind the following analysis is that if the shrimpers perceive the two closures as essentially one large closure, then the perceived impacts of the Texas Closure are minimal.

CHAPTER FIVE

ANALYSIS: PERCEPTIONS OF THE TEXAS STATE CLOSURE AND THE AND THE TEXAS CLOSURE

This chapter examines whether there are differences within and between each population with respect to their support of both the Texas state closure and the Texas Closure. This analysis determines whether the populations perceive the closures to be essentially one large closure or two separate closures. If there is a high degree of congruency in their support for both offshore closures, then it is assumed that they perceive the two closures as one large closure. If the closures are perceived to be as one, then it is concluded that the perceived effects of the Texas Closure are no different than those of the state closure. If, conversely, there are differences within and between populations in their support for the two closures, then it is presumed that there are perceived differences in the ways that the two closures have affected each population of inshore shrimpers. To ascertain their perceptions, shrimpers were asked how they felt about the various closures. They were given the options of answering either approving of, disapproving of, or having no opinion regarding the closures and providing comments to support their survey response. The results are analyzed using the non-parametric statistical tests of Chi Square, contingency coefficients and simple proportions (Siegel, 1956).

Perceptions of the Texas State Closure

Table 5 tests the difference between the perceptions of shrimpers in both bays towards the Texas state closure. The null hypothesis is that there is no difference in the way shrimpers in both bays perceive themselves to have been impacted by the Texas state closure. The research hypothesis is that there is a difference in perceptions between the two populations. The results presented in Table 5 are statistically significant and the null hypothesis is rejected. This suggests that the distribution of responses regarding support of the Texas state closure is most likely not due to chance.

Trends in Table 5 are apparent. Differences exist between those who have no opinion and those who support the state closure. Approximately 61 percent of the Calcasieu Lake shrimpers have no opinion regarding the state closure compared to 45 percent of their Galveston counterparts. Thus, proportionally more of the Galveston shrimpers perceive themselves to have been impacted than the Calcasieu shrimpers. Proportionally more of the Galveston shrimpers (33 percent) approve of the state closure than Calcasieu shrimpers (16 percent). Approximately, equal percentages of shrimpers from both regions disapprove of the state closure. Thus, while the state closure is perceived to have impacted each fishery negatively to the same degree, it is perceived to have had a less negative impact on Galveston Bay's inshore

Table 5. Perceptions of Galveston Bay and Calcasieu Lakeinshore shrimpers of the Texas state closure.

LOCATION	**STATE CLOSURE**			
	No Opinion	Disapprove	Approve	Total
Galveston	37 (44.6%)	19 (22.9%)	27 (32.5%)	83(56.5%)
Calcasieu	39 (60.9%)	15 (23.4%)	10 (15.6%)	64(43.5%)
Total	76 (51.7%)	34 (23.1%)	37 (25.2%)	147

n=147; missing cases=0; chi square=5.97; d.f.=2; p<=0.05; contingency coefficient=.19

shrimpers than on Calcasieu Lake's.

Comments provided by shrimpers from both regions shed some understanding on why shrimpers either approve or disapprove of the Texas state closure. The reasons why Galveston Bay shrimpers mentioned they disapproved of the state closure include the following: there is no money to make during the closure, it's unfair to small boats, it's tilted in favor of out of state boats ("Louisiana boats clean us out"), price drops the day the season opens, not well enforced, and the shrimp go to Mexican waters during the closure. These comments seem to reflect the interests of boats that harvest shrimp in the Gulf.

Those that provided comments on why they approved of the state closure mentioned almost unanimously (9 out of 10 comments approving of the state closure) that it is a good conservation measure in that it protects the shrimp until they spawn, thereby contributing to a more productive inshore season the following year. One shrimper who owns a bait camp approved of the closure because it protects sportfish; thus directly benefiting his bait camp business. Another shrimper liked the fact that when the season opens he can catch a lot at one time. It would seem from grouping the comments by content, that one would expect a relationship to exist between the perception of the state closure and where captains shrimp, that is, whether they remain in the bay or not. Tables 6 and 7, however, do not support this

Table 6. Relationship between support of the Texas state closure among Galveston Bay shrimpers and the location of their fishing grounds during the spring season.

OPINION	**FISHING LOCATION**		
	Bay	Bay/Gulf	Total
No opinion	27 (45.8%)	5 (35.7%)	32 (43.8%)
Disapprove	15 (25.4%)	2 (14.3%)	17 (23.3%)
Approve	17 (28.8%)	7 (50%)	24 (32.9%)
Total	59 (80.8%)	14 (19.2%)	73

n=73; missing cases=10; chi square=2.41; d.f.=2; p>.05; contingency coefficient=.18.

Table 7. Relationship between support of the Texas state closure among Galveston Bay Shrimpers and the location of their fishing grounds during the fall season.

OPINION	**FISHING LOCATION**		
	Bay	Bay/Gulf	Total
No Opinion	31 (46.3%)	5 (38.5%)	36 (45%)
Disapprove	13 (19.4%)	5 (38.4%)	18 (22.5%)
Approve	23 (34.3%)	3 (23.1%)	26 (32.5%)
Total	67 (83.7%)	13 (16.3%)	80

n=80; missing cases=3; chi square=2.33; d.f.=2; p>0.05; contingency coefficient=.17.

hypothesis. Neither of the tables have results that are statistically significant. Unfortunately, not enough shrimpers provided comments to conclusively determine exactly which group of shrimpers felt impacted by the closure in a particular way. One plausible explanation for the lack of a significant relationship between opinions of why shrimpers disapprove of the state closure and the location of their shrimping operations concerns whether the closure has personally impacted the shrimpers. In about one half of the cases, it has not. Only 15 (47 percent) out of the 32 Galveston shrimpers providing comments on their opinions about the state closures felt personally impacted by the closure. This indicates that many of the shrimpers are judging the closure on the value of its overall management objectives and impacts on the inshore fishery as a whole, rather than solely on the personal impact incurred by the closure.

The Calcasieu Lake shrimpers who commented on why they disapprove of the state closure almost unanimously complained that during the closure Texas boats flood Louisiana waters resulting in a reduction of harvest for individual Louisiana shrimpers. Some shrimpers commented on the price drop experienced when the closure opens; another mentioned that the shrimp go to Mexico during the closure. Those who approve of the state closure commented that it protects the shrimp until they spawn, and it makes for a good

opening day. Tables 8 and 9, test the hypothesis that support for the Texas state closure among Calcasieu Lake shrimpers is related to the location of their shrimping grounds. However, among the Calcasieu population the results are not statistically significant and therefore the relationship between perceptions of Calcasieu Lake shrimpers towards the Texas state closure and the location of their shrimping operation is not supported by the results. As with the Galveston Bay shrimpers, only about one half of the 20 Calcasieu Lake shrimpers (55 percent) who provided comments to support their opinions, felt personally impacted by the state closure.

Perceptions of the Texas Closure

Table 10 tests whether there is a difference between the two populations with respect to the way they perceive of the Texas Closure. The null hypothesis is that there is no difference in the distribution of responses regarding the perceptions of the Texas Closure between the Galveston Bay and Calcasieu Lake shrimpers. The results presented in Table 10 are statistically significant suggesting that the two distributions of responses are most likely a result of factors other than chance.

The data presented in Table 10 indicate that a greater proportion of shrimpers in both regions had no opinion regarding the Texas Closure. However, proportionally

Table 8. Relationship between opinions of the Texas state closure among Calcasieu Lake shrimpers and location of their shrimping grounds during the spring season.

OPINION	**FISHING LOCATION**		
	Bay	Bay/Gulf	Total
No Opinion	30 (69.8%)	6 (46.2%)	36 (64.3%)
Disapprove	9 (20.9%)	3 (23.1%)	12 (21.4%)
Approve	4 (9.3%)	4 (30.8%)	8 (14.3%)
Total	43 (76.8%)	13 (23.2%)	56

n=56; missing cases=8; chi square=4.11; d.f.=2; p>0.05; contingency coefficient=.26.

Table 9. Relationship between opinions of the Texas state closure among Calcasieu Lake shrimpers and location of their shrimping grounds during the fall season.

OPINION	**FISHING LOCATION**		
	Bay	Bay/Gulf	Total
No opinion	30 (66.7%)	9 (50%)	39 (61.9%)
Disapprove	10 (22.2%)	5 (27.8%)	15 (23.8%)
Approve	5 (11.1%)	4 (22.2%)	9 (14.3%)
Total	45 (71.4%)	18 (28.6%)	63

n=63; missing cases=1; chi square=1.8; d.f.=2; p>0.05; contingency coefficient=.17.

more Calcasieu shrimpers (72 percent) fell into this category than Galveston shrimpers (58 percent). A relatively equal number of shrimpers in both regions disapproved of the Texas Closure amounting to 17 percent and 22 percent of the Galveston and Calcasieu shrimpers, respectively. There is a difference in the proportion of shrimpers from each region who approved of the Texas Closure, with 25 percent of the Galveston shrimpers approving of the Texas Closure compared to only six percent of their Calcasieu Lake counterparts.

An interesting comparison can be made between Table 5 (p.77) and Table 10 (p.85). An almost equal proportion of shrimpers in both regions disapproved of the Texas state and Texas Closure. Perceptions of both closures reveal that proportionally more Galveston shrimpers had an opinion about both closures than Calcasieu shrimpers. The difference between the proportion of shrimpers from both regions who had an opinion is reflected in those that approve of the offshore closures.

These results suggest that both offshore closures had little perceived impact on the Calcasieu Lake inshore fishery; yet fewer of the Calcasieu shrimpers were opinionated about the Texas Closure than the Texas state closure. The results also suggest that the Galveston shrimpers were more opinionated about both closures than the Calcasieu shrimpers. The Galveston Bay shrimpers, like their Calcasieu Lake counterparts, were less opinionated about the

Table 10. Perceptions of Galveston Bay and Calcasieu Lake shrimpers of the Texas Closure.

LOCATION	TEXAS CLOSURE OPINION			
	No opinion	Disapprove	Approve	Total
Galveston	48 (57.8%)	14 (16.8%)	21 (25.3%)	83 (56%)
Calcasieu	46 (71.8%)	14 (21.8%)	4 (6.2%)	64 (44%)
Total	94 (64%)	28 (19%)	25 (17%)	147

n=147; missing cases=0; chi square=9.3; d.f.=2; $p<0.01$; contingency coefficient=.24.

Texas Closure than the Texas state closure. Of those that were opinionated, more of the Galveston Bay shrimpers perceived themselves to be positively impacted than Calcasieu Lake shrimpers.

Congruency in Perceptions of the State and Texas Closures

Table 11 examines the degree of congruence among Galveston Bay shrimpers concerning perceptions of the Texas Closure and state closure. The null hypothesis is that the distributions of perceptions of the Texas state closure and the Texas Closure among Galveston Bay shrimpers are random. The results presented in Table 11 are statistically significant suggesting that the distribution of perceptions of both closures are non-random. One will notice the greatest number of cases in each column falls along the diagonal from the top left to the bottom right. This diagonal reflects the congruency between opinions regarding the state closure and Texas Closure. The relationship is also relatively strong which is reflected in the contingency coefficient of 0.71. The highest degree of congruency occurs in the "No opinion" category. This indicates that those Galveston Bay shrimpers who have no opinion about the Texas Closure for the most part have no opinion about the state closure either. Interestingly, of those shrimpers who disapprove of the Texas Closure, slightly

less than one third feel otherwise about the state closure with 21 percent having no opinion and 11 percent approving of the state closure. Thus, one third of those shrimpers who disapprove of the Texas Closure have an opinion about the state closure that is not congruent with that of the Texas Closure. They either feel that the Texas Closure impacts the fishery negatively while the state closure has no impact (21 percent); or they perceive that the Texas Closure negatively impacts them whereas the state closure has a positive impact on their occupation (10.5 percent).

Of those shrimpers who approve of the Texas Closure, two thirds, likewise, approve of the state closure. However, one third of the Texas Closure "approvers" have no opinion about the state closure. To this group, the Texas Closure either supports an already beneficial state policy, or it is an added benefit to a policy that has traditionally done little to benefit or harm the inshore fishery of Galveston Bay.

Of the 15 Galveston shrimpers who provided comments on the two closures, ten felt differently about the Texas and state closures. Their comments help clarify the reasons for the discrepancies in their opinions concerning the two closures. Of those who approved of the state closure because of conservation reasons, two had no opinions about the Texas Closure, possibly meaning they believed the Texas Closure provided no additional benefit. Another shrimper who

Table 11. Support for the Texas state and Texas Closures among Galveston Bay shrimpers.

STATE CLOSURE	**TEXAS CLOSURE**			
	No opinion	Disapprove	Approve	Total
No opinion	36 (97.3%)	4 (21%)	8 (29.6%)	48 (58%)
Disapprove	0 (0%)	13 (68.4%)	1 (3.7%)	14 (17%)
Approve	1 (2.7%)	2 (10.5%)	18 (66.6%)	21 (25%)
Total	37 (45%)	19 (23%)	27 (32%)	83

n=83; missing data=0; chi square (Yates corrected)=75.22; d.f=4; $p<0.001$; contingency coefficient=.71.

believed the state closure provided protection of spawners, felt the Texas Closure allowed the shrimp to move to Mexico before being harvested. Thus, to this shrimper, the state closure was beneficial, but the Texas Closure had a negative impact. Interestingly, two of the shrimpers who disapproved of the state closure due to the influx of Louisiana boats and the loss of shrimp to Mexico, approved of the Texas Closure because it protects the spawners.

Table 12 examines the degree of congruence between the way the Calcasieu Lake inshore shrimpers perceive of the two closures. The null hypothesis is that the distribution of responses is random. As with the Galveston Bay shrimpers, the relationship between attitudes towards the two closures is statistically significant suggesting that the perceptions are non-random. In addition, the relationship between the two variables is relatively strong which is reflected by the contingency coefficient of 0.73, which is almost equal to the contingency coefficient among the Galveston Bay population. One will notice that those who have no opinion about the Texas Closure have no opinion about the state closure either. There is a 100 percent congruency in the perceptions of this group of shrimpers. Those who disap-prove of the Texas Closure, for the most part disapprove of the state closure as well (68.4 percent). A small percentage (21 percent) of the Texas Closure "disapprovers" had no opinion regarding the state closure indicating that to them, the

state closure had no perceivable impacts, yet the Texas Closure had a negative impact. Of those shrimpers who disapprove of the Texas Closure, 10.5 percent approve of the state closure. This small group of shrimpers perceive the Texas Closure to have had a negative impact on their livlihood, and the state closure a positive impact. For those Calcasieu shrimpers who approve of the Texas Closure, half have no opinion about the state closure suggesting that the Texas Closure offers benefits that the state closure does not. This compares to 29 percent of the Galveston shrimpers approving of the Texas Closure and having no opinion about the state closure. Of the remaining Calcasieu Lake shrimpers who approve of the Texas Closure, 40 percent likewise approve of the state closure, and only one (10 percent) out of the small group of ten Texas Closure approvers disapproved of the state closure.

The responses of Calcasieu Lake shrimpers regarding the Texas Closure are mostly the same as their comments of the state closure. Of those shrimpers who provided comments, the ones whose opinions of the two closures differed provide some clues as to why shrimpers perceive there to be differential impacts from the two closures. Some felt that the Texas Closure exacerbated the effects of the state closure with respect to fleet displacement from Texas to Louisiana and the price declines that accompany the opening. Three of the shrimpers who

Table 12. Support for the Texas state and Texas Closures among Calcasieu Lake shrimpers.

STATE CLOSURE	**TEXAS CLOSURE**			
	No opinion	Disapprove	Approve	Total
No opinion	39 (100%)	2 (13.3%)	5 (50%)	46 (71.9%)
Disapprove	0 (0%)	13 (86.6%)	1 (10%)	14 (21.9%)
Approve	0 (0%)	0 (0%)	4 (40%)	4 (6.2%)
Total	39 (61%)	15 (23.4%)	10 (15.6%)	64

n=64; missing cases=0; chi square (Yates corrected)=59.22; d.f.=4; $p<0.001$; contingency coefficient=.73.

approved of the state closure did so because of conservation reasons, but had no opinion on the Texas Closure; one reason given was that the shrimper does not shrimp in federal waters. Two of the shrimpers who disapproved of the state closure did so because Texas boats were displaced into Louisiana, but these shrimpers gave no opinion about the Texas Closure. One shrimper who had no opinion about the state closure disapproved of the Texas Closure because of its resultant fleet displacement. Because perceptions can be easily shaped by one's educational background tests were run to examine the relationship between education and perceptions. All shrimpers were grouped together since no statistical difference was found to exist between the numbers of shrimpers who completed various levels of education. The null hypothesis is that there is a random distribution of perceptions of the Texas state closure and Texas Closure among all shrimpers with respect to education level. It is hypothesized that shrimpers with less education will tend to have no opinion about the state and Texas Closures than those with higher levels of education. Tables 13 and 14 are not statistically significant. Therefore, one can not reject the null.

Table 13. Relationship between education level and perceptions of the Texas state closure.

Education (years)	**Opinions**			
	Approve	Disapprove	No Opinion	Total
less than 8	9 (24.3%)	9 (26.5%)	24 (32.9%)	42
9-12	20 (54.1%)	19 (55.9%)	32 (43.8%)	71
more than 12	8 (21.6%)	6 (17.6%)	17 (23.3%)	31
Total	37 (25.7%)	34 (23.6%)	73 (50.7%)	144

n=144; missing cases=3; chi square=1.98; d.f.=4; p>=.05; contingency coefficient=.11.

Table 14. Relationship between education level and perceptions of the Texas Closure.

Education (years)	**Opinions**			
	Approve	Disapprove	No Opinion	Total
less than 8	8 (32%)	6 (21.4%)	28 (30.6%)	42
9-12	11 (44%)	17 (60.7%)	43 (47.4%)	71
more than 12	6 (24%)	5 (17.9%)	20 (22%)	31
Total	25	28	91	144

n=144; missing cases=3; chi square=1.94; d.f.=4; p>=.05; contingency coefficient=.11.

Intra-Regional Differences

Chapter IV highlighted some obvious differences in the socio-demographic profile of the two inshore shrimp fisheries which serves as the basis for comparing the effects of these differences on each population's percep-tions of both closures. The more apparent and measurable differences include the time period in which each inshore fishery developed, vessel size, age of the shrimpers, and gear type. The relationship between education and percep-tions are examined within each population as well. The following series of analyses will examine the relation-ships between these four variables and the perceptions of shrimpers towards both the state and Texas Closures. Because the Calcasieu Lake inshore fishery has grown much more recently than that of Galveston Bay, the years of shrimping experience for the captains was selected to compare perceptions towards each closure within the historical context of the regulation's implementations. Vessel size is broken down into two categories: boats less than 25 feet, and boats equal to and larger than 25 feet. The reason for choosing these two categories is that the federal government implicitly recognized occupational differences between these two vessel size classes in their adoption of the regulations for the Turtle Excluder Device (TED) (Endangered Species Act, 1987). The regulations specify that boats that remain in inland waters and tow their trawls for less than 90 minutes need not

install a TED in their nets. Beginning in March of 1989, all boats in U.S. waters of the Gulf of Mexico that are less than 25 feet are not required to use TEDs if they tow less than 90 minutes. In addition, all boats equal to or greater than 25 feet are required to put TEDs in their nets regardless of their towing time.

Much controversy has resulted regarding the implementation of the TEDs. Shrimpers refuse to install them in their nets because they believe they reduce their shrimp catch. They have displayed a willingness to use force if the law is enforced. The Coast Guard, under pressure from Louisiana politicians, declared that they refuse to enforce the TED regulations and were therefore sued by environmentalists (Cooper, 1989). Currently, they are required to enforce the TED regulations, and the shrimpers are enforcing the regulation. Nevertheless, these regulations recognize location and effort differences between the two specified vessel size categories and serve as the basis for the following analyses. Age is divided into two categories: those shrimpers younger, and those older than the mean for each sample population. Gear type is not analyzed for the Galveston Bay population since the management regime only permits the use of trawl nets. Gear type categories for the Calcasieu Lake sample include trawl and butterfly nets. Each bay is examined separately.

Galveston Bay

Experience Shrimping

The relationship between the shrimpers' percep-tions of the Texas state closure and the number of years they have been shrimping has been analyzed using two different criteria. One grouping of categories, representing experience shrimping, examines the differences in perception between those shrimpers who began shrimping before, and those who began shrimping after the implementation of the state closure. The other grouping of categories separates shrimpers into those who began shrimping before and after the implementation of the Texas Closure.

The rationale for analyzing experience shrimping by the former criteria is to examine if the regulation itself may be responsible for differences in perception of the regulation. The latter method examines the possibility of synergistic effects on the opinions of the state closure by the Texas Closure. The synergistic effect was thought to be a factor in inshore shrimpers opinions of the state closure since shrimpers tended to perceive of the two closures as one large closure (see Table 11, p. 88). Table 15 tests the hypothesis that the opinions of Galveston Bay inshore shrimpers who began shrimping prior to 1959 (the passage of the Texas Shrimp Conservation Act implementing the state closure) concerning the Texas state closure differ from those

shrimpers who had began shrimping after 1959. The null hypothesis is that the distribution of perceptions by years shrimping is random. The results presented in Table 15 are not statistically significant. No relationship between perceptions of the state closure and whether or not shrimpers had been shrimping prior to its inception is identified.

Table 16 examines whether the implementation of the Texas Closure has influenced the perceptions of Galveston Bay shrimpers towards the state closure. The null hypothesis is that the distribution of perceptions of the state closure by whether or not a shrimper began shrimping before or after the implementation of the Texas Closure is random. The results presented in Table 16 are not statistically significant and do not support the hypothesis that the shrimpers attitudes towards the state closure are affected by the implementation of the federal closure.

Table 17 examines whether differences of opinions regarding the Texas Closure exist between those shrimpers who began shrimping prior to, and following 1981--the year the Texas Closure was first implemented. The results presented in Table 17 are not statistically significant and do not support the hypothesis that there is a relationship between shrimpers attitudes towards the Texas Closure and whether or not they began shrimping before its inception. The low value of the contingency coefficient supports the Chi Square by reflecting practically no relationship between the two

Table 15. Relationship between perceptions of Galveston Bay shrimpers of the Texas State closure and experience shrimping (pre and post 1959).

Opinion	**Year Shrimpers Began Shrimping**		
	Before 1959	After 1959	Total
No Opinion	29 (50%)	7 (31.8%)	36 (45%)
Disapprove	10 (17.2%)	8 (36.4%)	18 (22.5%)
Approve	19 (32.8%)	7 (31.8%)	26 (32.5%)
Total	58 (72.5%)	22 (27.5%)	80

n=80; missing cases=3; chi square=3.76; d.f.=2; p>0.05; contingency coefficient=.21.

Table 16. Relationship between perceptions of Galveston Bay shrimpers of the Texas state closure and experience shrimping (pre and post 1981)

OPINION	**YEAR SHRIMPERS BEGAN SHRIMPING**		
	Before 1981	After 1981	Total
No Opinion	25 (44.6%)	11 (45.8%)	36 (45%)
Disapprove	12 (21.4%)	6 (25%)	18 (22.5%)
Approve	19 (34%)	7 (29%)	26 (32.5%)
Total	56 (70%)	24 (30%)	80

n=80; missing cases=3; chi square=0.20; d.f.=2; p>0.05;

Table 17. Relationship between perceptions of Galveston Bay shrimpers of the Texas Closure and experience shrimping (pre and post 1981).

OPINION	**YEAR SHRIMPERS BEGAN SHRIMPING**		
	Before 1981	After 1981	Total
No Opinion	32 (57.1%)	14 (58.4%)	46 (57.5%)
Disapprove	8 (14.3%)	5 (20.8%)	13 (16.3%)
Approve	16 (28.6%)	5 (20.8%)	21 (26.2%)
Total	56 (70%)	24 (30%)	80

n=80; missing cases=3; chi square=.83; d.f.=2; p>0.05; contingency coefficient=0.10.

variables examined in Table 17. Thus, Tables 16 and 17 do not support the hypotheses that the year in which a Galveston Bay shrimper began shrimping is related to his or her opinion about the benefit of the policy.

Vessel Size

Table 18 examines whether vessel size influences perceptions of Galveston Bay shrimpers towards the state closure. The null hypothesis is that the distribution of responses by vessel size is random. As noted earlier, the size categories were selected based upon the criteria established for the regulation of TEDs. The results presented in Table 18 are not statistically significant and do not support the hypothesis that there is a relationship between perceptions of the state closure among Galveston Bay shrimpers and the size of their vessels.

Table 19 examines whether vessel size influences the perceptions of Galveston Bay inshore shrimpers towards the Texas Closure. The results presented in Table 19 are statistically significant suggesting that there is a relationship between perceptions of the Galveston Bay shrimpers towards the Texas Closure and the size of the vessel they operate. Proportionally more large boats disapprove of the Texas Closure than small ones. Likewise, more small boats approve of the Texas Closure than large ones. The comments provided by Galveston shrimpers seem to

Table 18. Relationship between perceptions of Galveston Bay shrimpers of the Texas state closure and vessel size.

OPINIONS	**VESSEL SIZE (feet)**		
	Less than 25 feet	Greater than 25 feet	Total
No Opinion	12 (54.5%)	25 (41%)	37 (44.6%)
Disapprove	1 (4.5%)	18 (29.5%)	19 (22.9%)
Approve	9 (41%)	18 (29.5%)	27 (32.5%)
Total	22 (26.5%)	61 (73.5%)	83

n=83; missing cases=0; chi square=5.71; d.f=2; p>0.05; contingency coefficient=0.27.

Table 19. Relationship between perceptions of Galveston Bay shrimpers of the Texas Closure and vessel size.

OPINION	**VESSEL SIZE (feet)**		
	Less than 25 feet	Greater than 25 feet	Total
No opinion	13 (59.1%)	35 (57.4%)	48 (57.8%)
Disapprove	0 (0%)	14 (22.9%)	14 (16.9%)
Approve	9 (40.9%)	12 (19.7%)	21 (25.3%)
Total	22 (26.5%)	61 (73.5%)	83

n=83; missing cases=0; chi square=7.94; d.f.=2; $p<0.05$; contingency coefficient=.32.

indicate that many inshore shrimpers perceive the Texas Closure to be a conservation measure which enhances the shrimp population in inshore waters the following year. Also, many boat captains remarked that during the closures, the shrimp go to Mexican waters. Perhaps the larger boats perceive the Texas Closure as causing them a personal sacrifice since many are capable of fishing the nine mile limit of Texas's territorial sea, whereas the additional distance of the Texas Closure prevents them from fishing at all. Lack of a significant number of comments among small boats does not permit this assumption to be examined. Thus, vessel size does not seem to influence the shrimpers opinions about the state closure, but it does for the Texas Closure. This seems to suggest that the two groups of shrimpers are affected equally by the Texas state closure, yet differentially by the Texas Closure.

To confirm this assumption, the fishing locations of the two vessel size categories were compared as to whether they shrimp exclusively in the Bay or shrimp in both the Bay and Gulf. Tables 20 and 21 test the hypotheses that there is a difference in the fishing locations of the two vessel size groups during the spring and fall seasons, respectively. The null hypothesis is that the distribution of boats by vessel size with respect to fishing locations is random.

Tables 20 and 21 do not prove that there is a statistically significant difference between the fishing

Table 20 . Relationship between fishing locations of small and large Galveston Bay boats during the spring season.

FISHING LOCATION	**VESSEL SIZE (feet)**		
	Less than 25 feet	Greater than 25 feet	Total
Bay	14 (93.3%)	45 (77.6%)	59 (80.8%)
Bay and/or Gulf	1 (6.7%)	13 (22.4%)	14 (19.2%)
Total	15 (20.5%)	58 (79.5%)	73

n=73; missing cases=10; chi square=1.90; d.f.=1; p>0.05;

Table 21 . Relationship between fishing locations of small and large Galveston Bay boats during the fall season.

FISHING LOCATION	**VESSEL SIZE (feet)**		
	Less than 25 feet	Greater than 25 feet	Total
Bay	19 (95%)	48 (80%)	67 (83.8%)
Bay and/or Gulf	1 (5%)	12 (20%)	13 (16.2%)
Total	20 (25%)	60 (75%)	80

n=80; missing cases=3; chi square=2.4; d.f.=1; p>0.05;

location of captains of small and large boats. This may explain why there is no difference in the captains of small and large boats with respect to their opinions of the state closure, but does not clarify the discrepancy of opinions regarding the federal offshore closure. It would be desirable to analyze the relationship between vessel size and the greatest distance fished from shore, however, appropriate data is not available.

Age

In examining the influence that age may have on the shrimpers perceptions of the state and Texas Closures, two categories were compared based on the mean age of Galveston Bay inshore shrimpers. The mean age was computed to be 45. Table 22 and 23 test the hypotheses that shrimpers who are younger and older than the mean age of the sample have different perceptions of the Texas state closure and the Texas Closure, respectively. The results presented in Tables 22 and 23 are not statistically significant showing no relationship between age and the shrimpers perceptions of either closure.

Education

Education was examined among the Galveston Bay shrimpers to identify a relationship between perceptions of the state and Texas closures and level of education. The

results are presented in tables 24 and 25. The results are not statistically significant identifying no relationship between education and perceptions of the closures.

Table 22. Relationship between the perceptions of Galveston Bay shrimpers of the Texas state closure and age.

OPINION	**AGE (years)**		
	Less than or equal to 45	Greater than 45	Total
No opinion	16 (41%)	20 (46.5%)	36 (43.9%)
Disapprove	9 (23.1%)	10 (23.3%)	19 (23.2%)
Approve	14 (35.9%)	13 (30.2%)	27 (32.9%)
Total	39 (47.6%)	43 (52.4%)	82

n=82; missing cases=1; chi square=.34; d.f.=2; p>0.05;

Table 23. Relationship between perceptions of Galveston Bay shrimpers of the Texas Closure and age.

OPINIONS	**AGE (years)**		
	Less than or equal to 45	Greater than 45	Total
No opinion	22 (56.4%)	25 (58.1%)	47 (57.3%)
Disapprove	9 (23.1%)	5 (11.6%)	14 (17.1%)
Approve	8 (20.5%)	13 (30.2%)	21 (25.6%)
Total	39 (47.6%)	43 (52.4%)	82

n=82; missing cases=1; chi square=2.3; d.f.=2; p>0.05; contingency coefficient=.16.

Calcasieu Lake

Experience Shrimping

The Calcasieu Lake population was examined to determine whether the number of years the shrimpers had been shrimping influenced their perceptions of the Texas state closure. As with the Galveston Bay population, experience shrimping was divided into two categories. Table 26 examines whether those shrimpers in Calcasieu Lake who had been shrimping since prior to 1959 have different perceptions of the Texas state closure than those who began shrimping after 1959. The results presented in Table 26 are not statistically significant and do not support the hypothesis that a relationship exists between the attitudes of Calcasieu Lake shrimpers towards the Texas state closure and whether or not they have been shrimping before its inception.

Table 27 examines whether those shrimpers who began shrimping prior to the implementation of the Texas Closure have different perceptions of the state closure than those shrimpers who began shrimping more recently. The null hypothesis is that the relationship is random. The results presented in Table 27 are statistically significant and do not allow us to reject the possibility that the Texas Closure may have influenced the shrimpers perception of the state closure. The data in Table 27 indicate that those shrimpers who began shrimping prior to the implementation of the Texas Closure overwhelmingly were unopinionated (93.7 percent)

Table 24. Perceptions of Galveston Bay shrimpers of the Texas state closure and years of education.

Education (years)	**Perception**			
	Approve	Disapprove	No Opinion	Total
0-8	6 (22.2%)	7 (36.8%)	15 (40.5%)	28
9-12	13 (48.1%)	10 (52.6%)	12 (32.4%)	35
more than 12	8 (29.6%)	2 (10.5%)	10 (27.1%)	20
Total	27	19	37	83

N=83; missing cases=0; chi square=5.1; d.f.=4; p>.05; contingency coefficient=.24.

Table 25. Perceptions of the Galveston Bay shrimpers of the Texas Closure and years of education.

Education (years)	**Perception**			
	Approve	Disapprove	No Opinion	Total
0-8	6 (28.6%)	4 (28.6%)	18 (37.5%)	28
9-12	9 (42.9%)	8 (57.1%)	18 (37.5%)	35
more than 12	6 (28.5%)	2 (14.3%)	12 (25%)	20
Total	21	14	48	83

N=83; missing cases=0; chi square=2.22; d.f=4; p>=.05; contingency coefficient=.16.

Table 26 .Relationship between perceptions of Calcasieu Lakeshrimpers of the Texas state closure and experience shrimping (pre and post 1959).

OPINION	**YEAR SHRIMPERS BEGAN SHRIMPING**		
	Prior to 1959	After 1959	Total
No Opinion	34 (66.6%)	5 (38.5%)	39 (60.9%)
Disapprove	12 (23.5%)	3 (23.1%)	15 (23.4%)
Approve	5 (9.8%)	5 (38.5%)	10 (15.6%)
Total	51 (79.7%)	13 (20.3%)	64

n=64; missing cases=0; chi square(Yates corrected)=4.78; d.f.=2; p>0.05; contingency coefficient=.31.

Table 27. Relationship between the perceptions of Calcasieu Lake shrimpers of the Texas state closure and experience shrimping (pre andpost 1981).

OPINION	**YEAR SHRIMPERS BEGAN SHRIMPING**		
	Prior to 1981	After 1981	Total
No Opinion	15 (93.7%)	24 (50%)	39 (61%)
Disapprove	0 (0%)	15 (31.3%)	15 (23.4%)
Approve	1 (6.3%)	9 (18.7%)	10 (15.6%)
Total	16 (25%)	48 (75%)	64

n=64; missing cases=0; chi square(Yates corrected)=7.37; d.f.=2; $p<0.05$ contingency coefficient=.37.

concerning the state closure. Of those shrimpers who began shrimping after the implementation of the Texas Closure, half had no opinion, one third disapproved, and slightly less than one fifth approved of the state closure.

Table 28 examines whether those Calcasieu Lake shrimpers who began shrimping prior to the implementation of the Texas Closure have different perceptions of the Texas Closure than those who began shrimping after the Texas Closure had been implemented. The results presented in Table 28 are not statistically significant showing no relationship between the perceptions of the shrimpers towards the Texas Closure and whether they had been shrimping prior to its inception.

Vessel Size

The population of Calcasieu Lake shrimpers was examined to determine if vessel size relates to the perceptions of the inshore shrimpers towards the Texas state closure. Table 29 examines whether captains of boats in different vessel size categories have different perceptions of the state closure. The results presented in Table 29 are statistically significant. Therefore, one cannot reject the possibility that vessel size influences the perceptions of Calcasieu Lake shrimpers towards the state closure. The captains of smaller boat were less opinionated (78 percent)

Table 28. Relationship between perceptions of Calcasieu Lake shrimpers of the Texas Closure and experience shrimping (pre and post 1981).

OPINION	**YEAR SHRIMPERS BEGAN SHRIMPING**		
	Prior to 1981	After 1981	Total
No Opinion	31 (64.6%)	15 (93.7%)	46 (71.9%)
Disapprove	14 (29.2%)	0 (0%)	14 (21.9%)
Approve	3 (6.3%)	1 (6.3%)	4 (6.3%)
Total	48 (75%)	16 (25%)	64

n=64; missing cases=0; chi square(Yates corrected)=4.80; d.f.=2; p>0.05; contingency coefficient=.29.

Table 29. Relationship between perceptions of Calcasieu Lake shrimpers of the Texas State Closure and vessel size.

OPINION	**VESSEL SIZE (feet)**		
	Less than 25 feet	Greater than 25 feet	Total
No Opinion	26 (78.8%)	13 (41.9%)	39 (60.9%)
Disapprove	6 (18.2%)	9 (29%)	15 (23.4%)
Approve	1 (3%)	9 (29%)	10 (15.6%)
Total	33 (51.6%)	31 (48.4%)	64

n=64; missing cases=0; chi square=11.28; d.f.=2; $p<0.01$; contingency coefficient=.39.

than larger boat captains (41.9 percent). Most of the remaining small boat captains disapproved of the state closure, and the remaining large boat captains were equally divided between disapproving and approving of the state closure.

Table 30 examines if differences exist in the perceptions of the Texas Closure between captains of small and large boats in Calcasieu Lake. The results presented in Table 30 are not statistically significant and do not support the hypothesis that vessel size influences the Calcasieu Lake shrimpers perceptions of the Texas Closure. This trend is exactly opposite of that found among the Galveston shrimpers where vessel size related to their perception of the Texas Closure but not the state closure. Among Calcasieu Lake shrimpers the results suggest that the Texas Closure, with vessel size related to their perceptions of the state closure but not the Texas Closure.

It is hypothesized that the location of the fishing grounds differ between small and large boats in such a way that the Texas state closure would influence the groups differentially, whereas the Texas Closure would have no impact on either group. Tables 31 and 32 test the hypotheses that in Calcasieu Lake boats shrimp in different locations during the spring season. However, the results in Table 32 are not statisically significant, suggesting that during the fall season, one cannot conclude that there is a significant

Table 30. Relationship between perceptions of Calcasieu Lake shrimpers of the Texas State Closure and vessel size.

OPINION	**VESSEL SIZE (feet)**		
	Less than 25 feet	Greater than 25 feet	Total
No Opinion	28 (84.8%)	18 (58.1)	46 (71.8%)
Disapprove	5 (15.2%)	9 (29%)	14 (21.9%)
Approve	0 (0%)	4 (12.9%)	4 (6.3%)
Total	33 (51.6%)	31 (48.4%)	64

n=64; missing cases=0; chi square= (Yates corrected)=4.10; d.f.=2; p>0.05; contingency coefficient=.32.

Table 31. Relationship between fishing locations of small and large Calcasieu Lake boats during the spring season.

OPINION	**VESSEL SIZE (feet)**		
	Less than 25 feet	Greater than 25 feet	Total
Bay	25 (89.3%)	17 (63%)	42 (76.4%)
Bay and/or Gulf	3 (10.7%)	10 (37%)	13 (23.6%)
Total	33 (51.6%)	31 (48.4%)	64

n=55; missing cases=9; chi square= 5.28; d.f.=1; $p<0.05$; contingency coefficient=.30

Table 32. Relationship between fishing locations of small and large Calcasieu Lake boats during the fall season.

FISHING LOCATION (feet)	**VESSEL SIZE**		
	Less than 25 feet	Greater than 25 feet	Total
Bay	26 (81.3%)	18 (60%)	44 (71%)
Bay and/or Gulf	6 (18.72%)	12 (40%)	18 (29%)
Total	32 (51.6%)	30 (48.4%)	62

n=64; missing cases=2; chi square=3.39; d.f.=1; $p<0.05$; contingency coefficient=.23.

difference between the number of small and large boats that shrimp in Calcasieu Lake.

Age

Tables 33 and 34 examine whether captains younger and older than the mean age of the sample population have different perceptions of both the state and Texas Closures, respectively. The mean age of the sample population is 43.3 years. The results presented in Tables 33 and 34 are not statistically significant. Therefore, one cannot conclude that age is related to the perceptions of Calcasieu Lake shrimpers of either closure. One notices little difference in the proportion of shrimpers in both age groups with respect to each of the opinions.

Gear Type

Calcasieu Shrimpers were examined to analyze the relationship between gear type and perceptions of the Texas state and Texas Closures. Table 35 examines whether those shrimpers who do not use butterfly nets perceive the state closure differently than those who use butterfly nets. In addition, Table 36 examines whether those shrimpers who do not use trawl nets perceive the state closure differently from those who do. The results presented in Tables 35 and 36 are not statistically significant. Therefore, one cannot conclude that the use of either type of gear has influenced the

Table 33. Relationship between perceptions of Calcasieu Lake shrimpers of the Texas State Closure and age.

OPINION	**VESSEL SIZE (feet)**		
	Less than 25 feet	Greater than 25 feet	Total
No Opinion	23 (63.9%)	16 (57.1%)	39 (60.9%)
Disapprove	8 (22.2%)	7 (25%)	15 (23.4%)
Approve	5 (13.9%)	5 (17.9)%	10 (15.6%)
Total	36 (56.2%)	28 (43.8%)	64

n=64; missing cases=0; chi square=.32; d.f.=2; $p<0.05$;

Table 34. Relationship between perceptions of Calcasieu Lake shrimpers of the Texas State Closure and age.

OPINION	**AGE (years)**		
	Less than or equal to 43.3	Greater than 43.3	Total
No Opinion	27 (75%)	19 (67.9%)	46 (71.9%)
Disapprove	7 (19.4%)	7 (25%)	14 (21.9%)
Approve	2 (5.6%)	2 (7.1%)	4 (6.2%)
Total	36 (56.2%)	28 (43.8%)	64

n=64; missing cases=0; chi square=.39; d.f=2; $p<0.05$;

Table 35. Relationship between perceptions of Calcasieu Lake shrimpers of the Texas State Closure and the use of butterfly nets.

OPINION	**USE OF BUTTERFLY NETS**		
	NO	YES	Total
No Opinion	14 (53.8%)	25 (65.8%)	39 (61%)
Disapprove	5 (19.2%)	10 (26.3%)	15 (23.4%)
Approve	7 (26.9%)	3 (7.9%)	10 (15.6%)
Total	26 (40.6%)	38 (59.4%)	64

n=64; missing cases=0; chi square=4.27; D.F.=2; P>0.05; contingency coefficient=.25.

Table 36. Relationship between perceptions of Calcasieu Lake shrimpers of the Texas State Closure and use of trawl nets.

OPINION	**USE OF TRAWL NETS**		
	No	Yes	Total
No Opinion	9 (50.8%)	30 (65.2%)	39 (60.9%)
Disapprove	6 (33.3%)	9 (19.6%)	15 (23.4%)
Approve	3 (16.7%)	7 (15.2%)	10 (15.6%)
Total	18 (28.1%)	46 (71.9%)	64

n=64; missing cases=0; chi square=1.55; d.f.=2; p<0.01; contingency coefficient=.15.

shrimpers perceptions of the state closure.

Tables 37 and 38 examine whether gear type influences how shrimpers perceive of the Texas Closure. The results presented in Tables 37 and 38 are not statistically significant. Similarly, one cannot conclude that the use of either gear type influences the perceptions of the shrimpers concerning the Texas Closure.

Education

Tables 39 and 40 examine the relationship between education level and the perceptions of the two closures among Calcasieu Lake shrimpers. The results are not statistically significant and therefore one cannot identify a relationship between the two variables.

Table 37. Relationship between perceptions of Calcasieu Lake shrimpers of the Texas Closure and use of butterfly nets.

OPINION	**USE OF BUTTERFLY NETS**		
	No	Yes	Total
No Opinion	18 (69.2%)	28 (73.7%)	46 (71.9%)
Disapprove	6 (23.1%)	8 (21.1%)	14 (21.9%)
Approve	2 (7.7%)	2 (5.3%)	4 (6.2%)
Total	26 (40.6%)	46 (59.4%)	64

n=64; missing cases=0; chi square=.22; d.f.=2; $p<0.05$;

Table 38. Relationship between perceptions of Calcasieu Lake shrimpers of the Texas Closure and use of trawl nets.

OPINION	**USE OF BUTTERFLY NETS**		
	No	Yes	Total
No Opinion	12 (66.7%)	34 (73.9%)	46 (71.9%)
Disapprove	6 (33.3%)	8 (17.4%)	14 (21.9%)
Approve	0 (0%)	4 (8.7%)	4 (6.25%)
Total	18 (28.1%)	46 (71.9%)	64

n=64; missing cases=0; chi square=3.16; d.f.=2; $p<0.05$; contingency coefficient=.21.

Table 39. Relationship between education level and perceptions of the Texas State Closure among Calcasieu Lake shrimpers.

EDUCATION (years)	**PERCEPTIONS**			
	Approve	Disapprove	No opinion	Total
0-8	3 (30%)	2 (13.3%)	9 (24.3%)	14
9-12	7 (70%)	9 (60%)	21 (56.8)	37
more than 12	0 (0%)	4 (26.7%)	7 (18.9%)	11
Total	10	15	37	62

n=64; missing cases=2; chi square=3.57; d.f.=2; $p<0.05$; contingency coefficient=.23

Table 40. Relationship between perceptions of Calcasieu Lake shrimpers of the Texas Closure and use of butterfly nets.

EDUCATION (years)	**PERCEPTIONS**			
	Approve	Disapprove	No opinion	Total
0-8	3 (30%)	2 (13.3%)	9 (24.3%)	14
9-12	7 (70%)	9 (60%)	21 (56.8%)	37
more than 12	0 (0%)	4 (26.7%)	7 (18.9%)	11
Total	10	15	37	62

n=64; missing cases=2; chi square=3.56; d.f.=42; $p<0.05$; contingency coefficient=.23

CHAPTER SIX

SUMMARY AND CONCLUSIONS

This research examined the social systems of the inshore shrimp fisheries of Galveston Bay, Texas and Calcasieu Lake, Louisiana. It then examined the relationship between variables in the social environment and the perceptions of the shrimpers towards the Texas state and Texas Closure. The study described two very different social environments. Galveston Bay is surrounded by urban communities, the largest of which are Houston and Galveston. The region is ethnically diverse and there are many employment alternatives to shrimping. The profile of the fishery reflects conditions in the surrounding environment. The fishery is ethnically diverse and much competition exists between the Vietnamese and native shrimpers. The fishery is not experiencing growth evidenced by the fact that the largest group of shrimpers fell into the 51-60 year old age bracket, and by the decline in the number of boats in the fishery over time. Galveston Bay's shrimp fishery is a medium boat fishery with most boats between 20 and 40 feet in length. The fishery is sprawled around the perimeter of the bay and most of the shrimp is distributed fresh to local markets.

These factors enable the Galveston Bay fishery to adapt to changing circumstances. Shrimpers can often find employment alternatives, the boats are for the most part

large enough to shrimp offshore and within the bay, and the Vietnamese population offers a market if shrimpers wish to sell their boats. Thus, a negative impact of a management policy can be offset by modifications in fishing behavior. It was observed on many occasions, for example, that inshore shrimpers modified their gear for longlining offshore rather than inshore shrimping because of the better conditions they perceived to have existed in the longline fishery.

Calcasieu Lake is surrounded completely by rural environments where farming and fishing are the two dominant industries aside from oil and gas production. Hence, employment in the two industries are inversely related. At the time of the research, employment in the petroleum industry was low and as a result there was evidence of growth in the fishery. It was found for example, that the largest group of shrimpers fell into the 31-40 year old age bracket. The fishery is much smaller than in Galveston Bay. With only five shrimp houses clustered in close proximity to each other, the shrimpers are less territorial within the Lake. Where they chose to unload their shrimp is largely determined by price rather than loyalty, in contrast to the arrangements among shrimpers and shrimp house owners in Galveston Bay. The inshore boats are small with most being less than 21 feet in length.

These shrimpers face fewer alternatives to shrimping if their livelihood is threatened. Their boats tend to be

too small to participate in other commercial fisheries offshore. But while a negative impact from a fishery policy would probably have graver consequences for the Calcasieu Lake fishery than the Galveston Bay fishery, the Calcasieu Lakery fishery is insulated from the offshore fishery both geographically and with respect to boat size.

These descriptions generated predictions as to how these populations might respond to the Texas Closure. It was hypothesized that since other variables in their system differed, that their ideology, that is, their perceptions of the Texas state and Texas Closures would differ as well. The direction of the difference was hypothesized to be one in which the Galveston Bay shrimpers would be more opinionated than the Calcasieu Lake shrimpers. It was also hypothesized that despite this difference in perception of the Texas Closure, the two populations would have opinions about the state closure that were consistent with those of the Texas Closure. If this hypothesis were supported, it would be assumed that the populations perceive the closures as one large closure rather than two separate closures. This, in turn, would suggest that the two populations do not perceive themselves to be impacted by the Texas Closure in any additional way than they have been impacted by the Texas state closure.

Table 41 identifies the tests that were examined in Chapter 5 and indicates which ones were significant. Table

41 is organized to reflect the thorough process of the analysis. The following discussion summarizes the results and their practical significance to managers.

The first of the major hypothesis was supported by the research results. The two populations differed in their perception of the Texas Closure. While most of the Calcasieu Lake shrimpers wee unopinionated about the Texas Closure, the Galveston Bay shrimpers were fairly evenly divided between having no opinion and having an opinion about the Texas Closure. Those Galveston shrimpers who had an opinion about the Texas Closure were equally divided between approving and disapproving of it. On the whole, the interesting finding in analyzing this first major hypothesis is that the Galveston Bay shrimpers were more opinionated about the Texas Closure than their Calcasieu Lake counterparts. While this trend was also apparent in their perceptions of the state closure, both populations were less opinionated about the Texas Closure than the Texas state closure. Of pratical significance is that the "no opinion" category accounted for the statistical difference in the tables.

Generating deductions from responses of "no opinion" is risky because "no opinion" is a very ambiguous response. It could reflect an intimidation of the respondent to the researcher, who at the time was working for a government agency. It could be that those with no opinion were less educated than those who expressed an opinion. Or it could be

Table 41. Summary of tests and their significance.

TESTS	SIGNIFICANT	NOT SIGNIFICANT
Perceptions of the State Closure Among Galveston Bay and Calcasieu Lake Shrimpers	•	
Perceptions among Galveston Bay shrimpers by fishing location during spring season		•
Perceptions among Galveston Bay shrimpers by fishing location during fall season		•
Perceptions among Calcasieu Lake shrimpers by fishing location during spring season		•
Perceptions among Calcasieu Lake shrimpers by fishing location during fall season		•
Perceptions Of Federal Closure Among Galveston Bay and Calcasieu Lake Shrimpers	•	
Galveston Bay: Congruency in Perceptions of State and Federal Closures	•	
Calcasieu Lake: Congruency in Perceptions of State and Federal Closures	•	
Perceptions of all shrimpers of State and Federal Closure by Education Level		•
Calcasieu Lake		
Experience Shrimping		
State closure by experience shrimping (pre and post 1959)		•
State closure by experience shrimping (pre and post 1981)	•	
Texas Closure by experience shrimping (pre and post 1981)		•
Vessel Size		
State Closure by vessel size	•	
Texas Closure by vessel size		•
Age		
State Closure by age		•
Texas Closure by age		•
Gear Type		
State Closure by gear type		•
Texas Closure by gear type		•
Education		
State Closure by education		•
Texas Closure by education		•
INTRA-REGIONAL DIFFERENCES		
Galveston Bay		
Experienced Shrimping		
State Closure by experience shrimping (pre and post 1959)		•
State Closure by experience shrimping (pre and post 1981)		•
Texas Closure by experience shrimping (pre and post 1981)		•
Vessel Size		
State Closure by vessel size		•
Texas Closure by vessel size	•	
Fishing location by vessel size-spring season		•
Fishing location by vessel size-fall season		•
Age		
State Closure by age		•
Texas Closure by age		•
Education		
State Closure by education		•
Texas Closure by education		•

that they are truly not impacted by the regulation. In other words, a "no opinion" response could mean a number of different things. No test was undertaken to precisely examine the influence of the researcher on the responses. However, the researcher is confident that a distrust of the questioner was not a major influence on the responses of the shrimpers. The shrimpers were very receptive to responding to questions that solicited their opinions on management strategies. They are very rarely asked about impacts of management stratagies on their livelihood and expressed gratitude that those working for a fishery management agency cared to know what they thought of a management policy. Although not addressed in this thesis, they were much more opinionated about management strategies regulating inshore fisheries which do in fact directly influence their livelihood. Thus, it is which confidence that the researcher concludes that "no opinion" means no impact. Tests were run to eliminate a number of possible factors that could influence a shrimper to have an opinion or no opinion. These tests included fishing locations, experience shrimping, age, education, and gear type.

No statistical difference was identified between the perceptions of those shrimpers who remained in inland waters and those who ventured into the Gulf. But while these tests did not prove to be statistically significant, it was believed by the researcher that the data was not sufficient

to accurately test this relationship. Information concerning exactly how far out in Gulf the shrimpers fished would have been more valuable information to test a relationship between perceptions and fishing location. However, there was shown to be a statistically significant relationship between perceptions of the Texas Closure and vessel size among captains of Galveston Bay boats. More of the captains of larger boats were unsupportive of the Texas Closure than captains of smaller boats. This hints at the possibility that the distance that a captain shrimps from shore influences his/her support of the Texas Closure since larger boats can more easily venture further away from land than smaller boats. Perhaps the closure of federal waters past nine nautical miles from shore impacted those boat captains who were able to fish both in the bay and near the nine nautical mile limit. Meanwhile, it was clear from the comments provided by the captains that captains of small boats viewed the Texas Closure as a conservation technique that enabled more shrimp to spawn, providing for a more productive inshore season the following year. No relationship was demonstrated between perceptions of the Texas state closure and vessel size.

The possibility that perceptions of the closures among Galveston Bay captains were influenced by such factors as age, education, or experience shrimping was rejected. Among the Calcasieu Lake population, age, education, and gear

were not shown to influence perceptions of captains towards either closure. An intersting but logical difference was revealed between the perceptions of Calcasieu Lake and Galveston Bay boat captains. While vessel size was related to perceptions of the Texas Closure among the Galveston Bay population, vessel size and perceptions of the Texas state closure were related among the Calcasieu Lake population. The majority of the Calcasieu Lake captains of small boats (78.8 percent) had no opinion about the Texas state closure compared to only 41 percent of the captains of large boats. The captains of large boats who had an opinion were equally divided between approving and disapproving of the Texas state closure.

The timing of the Texas state closure and examination of the fishing locations of captains of small and large boats offers some clue as to why this difference appeared in the results. The Texas state closure (and Texas Closure) occur from approximately June 1 through July 15. The inshore spring season lasts from approximately May 15 through July 15 and the fall season lasts from the third Monday in August through November. During the spring season, the juvenile brown shrimp are schooling and heading offshore, and the inshore fishery is intercepting their migration. At this time, the shrimp are small and have little value, and it is not worthwhile for larger boats to shrimp in Calcasieu Lake because not enough money can be made to cover operating

costs. This difference in fishing locations during the spring season in Louisiana among captains of large and small boats was revealed in the results where more large inshore boats shrimped in the Gulf than small inshore boats. No difference in fishing location between small and large boats was revealed for the fall season when the more valuable larger white shrimp are found in Calcasieu Lake. The fact that larger Calcasieu Lake boats tend to fish in the Gulf off of Louisiana (where there is no season closure) explains why more of the captains of larger boats perceived themselves to be impacted by the Texas state closure than captains of smaller boats.

The second major hypothesis examined was also supported by the data; namely, that the perceptions of each population of shrimpers towards both closures would be consistent. The results showed a high degree of congruence between the perceptions of the shrimpers in both regions towards the Texas state closure and Texas Closure. The contingency coefficient that was generated for each of these tests were relatively strong with a .71 and .73 for the Galveston Bay and Calcasieu Lake populations respectively. What this seems to suggest is that there is perceived to be little additional impacts from the Texas Closure than the Texas state closure.

How can these results be useful to managers? The significance that this study offers to managers parallels the

significance that the study by Klima et al (1985) had for The Gulf of Mexico Regional Management Council. The Council modified the Texas Closure based upon the survey of offshore shrimp captains and their perceptions of the Texas Closure. Similarly, it is believed that this study offers the same type of information to managers. The results suggest that it is not necessary for managers to modify the Texas Closure further based upon the realized or potential impacts of this policy on the inshore fisheries along the Gulf of Mexico. Few impacts have been perceived from the Texas Closure by the inshore populations examined.

While this study has focused on Galveston Bay and Calcasieu Lake, it is believed by the researcher that generalizations can be made regarding all inshore fisheries along the Gulf. The two bays not only represent the socioeconomic diversity that characterizes the coastal communities along the Gulf of Mexico, but they exist in the region where the most discontent of the Texas Closure has been voiced by offshore shrimpers. Thus, these inshore fisheries would presumably reflect the greatest degree of discontent towards the Texas Closure as well.

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